CHARLES KNIGHT'S

ILLUSTRATED

NATURAL HISTORY.

E1583D

D

CHARLES KNIGHT'S

ILLUSTRATED

NATURAL HISTORY

Common Squirrel.

THE LONDON AND NEW YORK PRINTING AND PUBLISHING COMPANY, LIMITED.
LONDON; AND 199, BROADWAY, NEW YORK.

KNIGHT'S

PICTORIAL MUSEUM

OF

ANIMATED NATURE

AND

Companion for the Zoological Gardens.

ILLUSTRATED WITH FOUR THOUSAND WOOD ENGRAVINGS.

VOL. I.

MAMMALIA AND BIRDS.

PUBLISHED BY THE LONDON PRINTING AND PUBLISHING COMPANY, LIMITED,
LONDON AND NEW YORK.

PREFACE.

In laying before the public the following work, so comprehensive and complete in all its departments, and so profusely illustrated, it seems almost unnecessary to do more than to state, generally, that it embraces the whole range of animal and vegetable existence. This fact, in itself, may sufficiently suggest the exhaustless stores it contains of the most delightful of all kinds of human knowledge, as displayed in the endless variety of the forms, the habits, and the peculiarities which, in both still and active life, it opens to the mind of the reader. By him, such a work may be regarded as an epitome of the terrestrial and aqueous globe, in which he, himself, is but a unit; and whilst he possesses the consciousness of his own existence, he will find that he is everywhere encompassed by other existences, growing, strengthening, decaying, and dying, to yield the material for new shapes, and, perhaps, new species, in both the animal and the vegetable kingdoms. Thus will he see that the whole system of animated nature may be considered as entirely consisting of active forms and forces, carrying on the grand business of the world, which is to *live*, by providing the means for so doing, until the natural law of their being has been completely fulfilled.

So far as the knowledge of the naturalist has yet extended, in reference to Mammals, Birds, Reptiles, Insects, Fishes, and Botany, so far will it be found recorded and pictorially represented in the following history. In its pages the careful reader is made cognizant of the natures, forms, and peculiarities of the inhabitants of the earth, the air, and the sea, as well as of the various species of plants with which each of the zones is adorned. It has been remarked that mammals may be surpassed in the rapidity with which their blood circulates; in the extent and perfection of their breathing processes; in the temperature of their bodies, and in the concomitant vigour of their muscular actions: but, in their physical phenomena, they, as a class, hold superiority over all other animals. Hence they naturally take the first place in every work professing to embrace the whole range of Natural History; and hence they are first treated of in the following pages. Whatever may be their structural defects or deficiencies, however, these will be found amply compensated in the birds, whose beauty of plumage, variety of voices, elegance of figures, and general animation and activity, render them among the most charming objects of creation. The instincts by which these winged creatures are usually so unerringly guided, will, in many instances, take the uninitiated reader by surprise. He will be struck with the patience they display during the period of incubation; with their parental devotion to their offspring; with the untiring exertions, even of birds of prey, to procure food for their naked young; with the boldness of even the barn-door fowl, when called upon to protect its brood from the attack of some predaceous foe hovering over them, watching an opportunity to stoop and carry one of them away. In the mammalia, this instinct is likewise strongly exhibited: but these indications of the development of yet higher attributes, beautiful as they are, have, in the inferior animals, only a brief existence, for their young are altogether abandoned so soon as they are able to provide for themselves. The preservation and the love of offspring for lengthened periods only belong to the human family; and when these are based upon sympathy and respect, they form the grand groundwork and cement of social communities.

As every department in the treatment of Natural History should be made as complete as possible within itself, this aim has never been lost sight of during the compilation of the vast body of matter comprised within the compass of the following work. Accordingly the labours of Linnæus, Cuvier, Audubon, Wilson, Waterton, Darwin, Agassiz, Humboldt, Livingstone, and Chaillu, appear in a clear, yet comprehensive form, which, from its variety, fills the mind with wonder whilst inspiring it with the highest gratification. As Audubon and Humboldt have made us acquainted with many of the *fauna* and *flora* of both the Americas, Livingstone and Chaillu have informed us of many singular features relative not only to the physical geography, but to the animal and plant life of Africa. This last gentleman has explored a considerable part of the western equatorial region of that continent. From the neighbourhood of the Gaboon river he pushed into the interior, where he fell-in with cannibal tribes of natives, and also encountered that frightful ape, the gorilla. Speaking of this repulsive creature, he tells us that it has driven nearly all the other animals from the forests which it haunts. Neither the rhinoceros, the buffalo, horse, ox, ass, or giraffe, is found where the gorilla dwells; even the lion has retired before its roar, which can be heard at an incredible distance, and is frequently mistaken for thunder. The native idea of this ape is, that it combines the savage nature of a brute with the intelligence of a human being. When brought face to face with man, its rage is ungovernable. Its eyes flash defiance; whilst with its fists it beats its breast so violently, as to make it sound like an enormous drum. Its appearance reminded M. Chaillu of some infernal, dream-like creature, half-man, half-beast, as depicted by the old masters in their representations of the lower regions. But, however close may be its resemblance to man, we are assured, by Professor Owen, that it is distinguished by important differences, which preclude the possibility of a development of the human being from the brute. The formation and setting of the great toe are essentially different, converting the foot into a grasping hand. It also possesses thirteen pairs of ribs, whereas man has only twelve; and the brain-case is not larger than an infant's, although the weight of the enormous head is seven or eight times greater than that of the human skull. The details of its habits, however, will be found fully set forth in the succeeding general introduction.

The immense number of illustrative wood-cuts accompanying the letter-press of this History of Animated Nature, it is believed will be of infinite service in conveying correct ideas of the forms of the countless animals, flowers, herbs, and plants described; while the steel engravings tend greatly to beautify and enhance the value of the work. These attractions have not been produced without an enormous expenditure of time, labour, and money. Nevertheless, it is hoped that the demand for a Natural History containing so much that is useful, instructive, and pleasing, will be such as will reward the enterprise of the Publishers, who, in undertaking it, have been actuated, at least, as much by a public as by a private spirit.

London.

CONTENTS OF VOLUME I.

MAMMALIA.

Descriptions.	Pages.	Illustrations. Nos.
Felidæ (cat-tribe) . .	1—11	1—59
Marsupialia	14—23	60—110
Quadrumana . . .	26 —	— —
Orangs	26—30	111—129
Gibbons	30—31	130—137
Monkeys	33—39	138—169
American monkeys .	39—46	170—192
Lemurs	46—51	193—218
Quadrumana fossil . .	51 —	— —
Rodentia	54 —	— —
Squirrels	54—55	219—231
Dormice	55—58	232—236
Jerboas	58—59	237—251
Mice	59—66	252—268
Beaver	66 —	269—270
Musquash	66 —	271— —
Burrowing rats . . .	67—70	272—284
Utia	70 —	285—286
Coypu	70 —	287—288
Porcupines	70 —	289—294
Chinchillas	71—74	295—302
Pacas	74 —	303—306
Agoutis	74—78	307—315
Leporidæ (Hares) . .	78 —	316—320
Pachydermata . . .	79 —	— —
Elephant	79—86	321—367
Mastodon	87 —	368—370
Hippopotamus . . .	87—90	371—374
Rhinoceros	90—91	375—390
Daman or Hyrax . .	91—94	391—395
Tapirs	94 —	396—403
Hogs	95—101	404—442
Horses	102—110	443—481
Adapis	110 —	482 —
Dinotherium . . .	111 —	483—490
Toxodon . . .	111—114	491—510
Ruminantia	115 —	— —
Camels	115—120	511—546
Llamas	121—123	547—556
Giraffe	123—126	557—566
Musk deer	127 —	567—577
Cervidæ	129 —	— —
Deer	130—138	578—619
Antelopes	139—147	620—659
Goats	147—150	660—671
Sheep	150—155	672—685
Oxen	155—170	686—740
Buffaloes	170—174	741—767
Edentata	175 —	— —
Sloths	175—176	768—773
Mylodon	177—178	774—778
Scelidotherium . . .	178 —	779—783
Megatherium . . .	178—179	784—789
Armadilloes . . .	179—182	790—804
Anteaters	182—183	806—812
Manis	183—184	813—822
Ursidæ, or Bears . .	185—190	823—850
Racoon	190 —	851—852
Panda	191 —	853—854
Coati	191 —	856— —
Kinkajou	191 —	857—859
Canidæ	194 —	— —
Dogs	193—202	860—900
Wolf	203—206	901—915
Jackal	206 —	916—919
Fox	206—207	920—926
Cape Hunting Dog .	207—208	927 —
Hyænas	209—211	928—938
Civets	211—212	939—946
Cryptoprocta . .	211 —	947 —
Ichneumons . . .	213—214	948—958
Weasels	215—218	959—967
Ratel	218 —	968—970
Badgers	219 —	971—974
Otters	219—222	975—983
Seals	222—226	984—1014
Bats	227—230	1015—1036
Insectivora . .	231 —	— —
Shrews	231—234	1037—1050
Moles	234—235	1051—1060
Hedgehog	235 —	1061—1063
Tenrecs	235 —	1064—1066
Gymnure	235—238	1067 —
Banxring	238 —	1068—1072
Pachydermata, aquatic.	238 —	1073—1080
Dugong	238 —	1081 —
Manatee	238 —	1082 —
Zeuglodon	238 —	1083 —
Cetacea (Whales) . .	239 —	1084—1085
Dolphins	239—242	1086—1092
Cachalots	242—243	1093—1099
Whales, proper . . .	243—246	1100—1112
Quadrumana, additions to	246 —	1113 —
Ursidæ, additions to .	246 —	1114—1115
Viverridæ, additions to.	247 —	1116—1133
Rodentia, additions to .	247 —	1134—1135
Cats, tails of . . .	247 —	1136

BIRDS.

Birds (Aves) . . .	249—254	1137—1198
Raptores	255 —	— —
Falconidæ	255 —	— —
Eagles	256—266	1199—1232
Falcons	266—270	1233—1249
Hawks	270—271	1250—1256
Kites	271—273	1257—1260
Buzzards	274—275	1261—1264
Vultures	275—280	1265—1286
Owls	281—284	1287—1305
Caprimulgidæ (Nightjars or Goatsuckers) .	285—290	1306—1327
Hirundinidæ (Swallow)	290—295	1328—1342
Todidæ (Todies) . .	295 —	1343—1345
Halcyonidæ (Kingfishers)	295—298	1346—1359
Meropidæ (Bee-eaters)	299 —	1360—1365
Trogonidæ (Trogons) .	299—302	1366—1371
Muscicapidæ (Fly-catchers) . .	303 —	1372—1375
Laniadæ (Shrikes) . .	303—306	1376—1385
Coracinidæ (Fruit-crows)	306 —	1386—1389
Ampelidæ (Chatterers)	306—310	1390—1396
Pipridæ (Cotingas and Manakins) . . .	310 —	1397—1402
Paridæ (Tits) . . .	310—314	1403—1413
Sylviadæ (Warblers) .	314—322	1414—1455
Merulidæ (Thrushes) .	322—327	1456—1478
Menuridæ (Lyre-bird) .	327—330	1479—1481
Fringillidæ (Finches) .	330—339	1482—1522
Sturnidæ (Starlings) .	339—342	1523—1529
Buphagidæ (Pique-Bœufs) . . .	342 —	1530 —
Corvidæ (Crows) . .	342—346	1531—1552
Paradiseidæ (Birds of Paradise) . . .	346—350	1553—1562
Phytotomidæ (Plant-cutters) . . .	350 —	1563 —
Coliadæ (Colies) . .	350 —	1564 —
Musophagidæ (Plantain eaters)	350 —	1565—1570
Buceridæ (Hornbills) .	350—351	1571—1574
Upupidæ (Hoopoes) .	351—352	1575—1578
Scansores	354 —	— —
Ramphastidæ (Toucans)	354—358	1579—1593
Cuculidæ (Cuckoos) .	358—362	1594—1602
Psittacidæ (Parrots) .	362—366	1603—1625
Certhiadæ (Creepers) .	366—370	1626—1634
Picidæ (Woodpeckers)	370—375	1635—1659
Trochilidæ (Humming birds)	375—379	1660—1676
Cinnyridæ (Sun-birds) .	379 —	1677—1679
Nectariniadæ (Honey-suckers) . . .	379 —	1680
Meliphagidæ (Honey-eaters)	379 —	1681—1682
Promeropidæ (Promeropes)	379—382	1683—1684
Wood-swallows . . .	382 —	1685—1688
Wren	382 —	1689—1690
Goldcrest	382—383	1691 —
Wood-wren	383 —	1692 —
Gyratores	383 —	— —
Columbidæ (Pigeons) .	383—390	1693—1717
Rasores	390 —	— —
Phasianidæ (Fowls and Pheasants) . . .	390—398	1718—1754
Tetraonidæ (Grouse)	398—400	1755—1764

LIST OF PLATES.

VOL. I.

The Rhinoceros—(*Frontispiece.*)

The Squirrel—(*Vignette Title.*)

PAGE

The Barbary Ape and Ourang-Outang 1

The Elk 3

The Elephant 5

The Hippopotamus 7

The Racoon 9

The Polar Bear 11

The Arabian Camel 13

The African Wild Boar 15

The Crested and Brazilian Porcupine 17

The Harnessed Antelope 19

The Proboscis Monkey and Long-armed Ape 21

The Ass 23

The Many-horned and Wallachian Sheep 25

The Mustache and Ribbed-nose Baboon 27

The Striped Hyæna 29

The Flying and Virginian Opossum 31

The Kangaroo 33

The Tiger 35

The Brown Bear 37

GENERAL INTRODUCTION.

If there be one study more interesting than another, and one in which men of all countries would most ardently engage, it is that which is brought under the comprehensive denomination of Natural History, or the History of Nature. This study may properly be divided into two parts, taking separately the name of Natural History and Natural Science; the first viewing bodies in a state of comparative inactivity, and the second considering them in a condition of mutual action. There are some writers who divide Natural History into *general* and *particular*, both of which terms have been defined by Cuvier. "*General Natural History* considers, under a single point of view, all natural bodies, and the common result of all their actions in the great whole of nature. It determines the laws of the co-existence of their properties, and establishes the degree of resemblance which exists between different bodies. It also classes them according to these degrees. The *particular natural history* of any body, to be perfect, should comprehend, first, the description of all the sensible properties of that body, and of all its parts; second, the mutual relations of these parts, the motions which they produce, and the changes which they undergo whilst they remain united; third, the active and passive relations of this body with every other body in the universe; fourth, the explanation of all these phenomena."

In Mr. Richard Owen's work on the *Classification and Geographical Distribution of the Mammalia*, we are told that centuries elapsed before any advance was made in the science of zoology, as it was bequeathed to the intellectual world by the mind of Aristotle. Of no other branch of human knowledge does the history so strongly exemplify the fearful phenomenon of the arrest of intellectual progress, resulting in the "dark ages." The well-lit torch which should have guided to further explorations of the mighty maze of animated nature, was suffered to fall from the master hand, and left to grow dim and smoulder through many generations, ere it was resumed, fanned anew into brightness, and a clear view regained both of the extent of ancient discovery, and of the right course to be pursued by modern research. Linnæus first definitely and formally restored the great natural class we are now treating of to its Aristotelian integrity; and applying to it that happy instinct of discernment of significant outward characters which had enabled him to effect so much for the sister science of botany, he proposed for it the name of Mammalia.

The active cultivation of the science of observation stimulated by Ray, Linnæus, and Buffon, had brought to light instances—*e.g.*, in certain lizards—of viviparous quadrupeds which differ in structures of classific importance from the Zootoka Tetrapodo of Aristotle. Certain forms of true fishes were now known to bring forth their young alive, as well as the fish-like Retoda. The term Zootoka ceased to be applicable, exclusively, to the class of which Aristotle had sketched out the bounds; and naturalists gladly accepted, and have since retained, the neat and appropriate, and truly distinctive, term proposed by Linnæus—the term which was suggested by the outward and visible part of the apparatus by which the warm-blooded viviparous animals exclusively nourish their new-born young.

Among modern naturalists, the name of Louis Agassiz takes a prominent place. This distinguished French naturalist was, for many years, Professor of Natural History at Neufchatel. In 1847, he became, by invitation, Professor of Natural History in Cambridge College, Massachusetts, America. As a naturalist his fame dates from 1828; and much of his attention has been devoted to fossil remains. He was the first to propose the division of fossil fishes, in accordance with the formation of their scales. He was, also, amongst the first to confirm Mr. Shuttleworth's discovery of animalculæ being in the red snow of the Alps; and has shown that there are higher forms of animal existence there than were before suspected. As a geologist, he has directed attention to a large series of important phenomena; and has, in various publications, developed the views he has been led to entertain upon them. He is an upholder of the doctrine which teaches the successive creation of higher orders of organised beings on the surface of the earth, and believes that the human race has had, in its several distinct species, separate stocks of originality, both as to time and space. As an author, his contributions to Natural History have been extensive; and it may be remarked that he was the founder of the *Bibliographia Zoologica et Geologica*—a great work, which has been edited by the late Mr.

Strickland and Sir W. Jardine, Bart. On the death of the late Professor Edward Forbes, he was offered the chair of Natural History in Edinburgh; but he declined it.

Audubon, the distinguished American naturalist, was first inspired by his father with that love of natural objects with which his pursuits were to be afterwards so prominently identified. The study of birds especially became a passion with him; and in order that he might become a good draughtsman, his father, at the age of fourteen, sent him to Paris, and placed him in the studio of the celebrated David. By his seventeenth year, he had applied himself so diligently that he had become a skilful artist, when he returned to his native country; and his father gave him a farm on the banks of the Schuylkil. Here ornithological studies employed a great deal more of his time than farming employments. He married, and continued to explore the American forests in search of new specimens of the feathered tribes, to enlarge his collections. These excursions were prolonged to nearly fifteen consecutive years. Having removed to Louisville, he met Wilson, the celebrated Scotch ornithologist, whose conversation added to his ardour in his favourite pursuits. In 1810, with his wife and child, he set out on an expedition down the Ohio; next went through Florida; and so continued, as long as he lived, to extend his knowledge of American birds. He visited England twice, and was everywhere received with the attention and distinction due to so truthful a naturalist. He became a Fellow of the Zoological and Linnæan Societies in London; of the Natural History Society of Paris; and of numerous other societies of smaller note. His book on American ornithology is the largest and grandest that has ever been published.

In treating of the geographical distribution of the mammalia, it is observed by Mr. Owen, "that mammals may be surpassed in the rapidity with which the blood circulates; in the extent and completeness of the breathing process; in bodily temperature; in the concomitant vigour of the muscular actions—all which superiorities, in birds for example, result in those marvellous powers of flight with which the feathered class are privileged. But in their psychical phenomena, the mammalia, as a class, excel all other animals. Let me exemplify this by reference to the reproductive economy in the vertebrate series.

"The instinctive sense of dependence upon another, manifested by the impulse to seek out a mate—which impulse, even in fishes, is sometimes so irresistible, that they throw themselves on shore in the pursuit—this first step in the supersession of the lower and more general law of individual or self-preservation, although not first introduced at the vertebrate stage of the animal series, is never departed from after that stage has been gained. To this sexual relation is next added a self-sacrificing impulse of a higher kind—viz., the parental instinct. As we rise in the survey of vertebrate phenomena, we see the entire devotion of self to offspring in the patient incubation of the bird; in the unwearied exertions of the swift or the hawk to obtain food for their callow brood when hatched; in the bold demonstration which the hen, at other times so timid, will make to repel threatened attacks against her cowering young.

"Still closer becomes the link between the offspring and parent in the mammalia class, by the substitution, for the exclusion of a passive, irresponsive ovum, of the birth of a living young, making instinctive, irresistible appeal, as soon as born, to maternal sympathy; deriving nutriment immediately from the mother's body, and both giving and receiving pleasure by that act. These beautiful foreshadowings of higher attributes are, however, transitory in the brute creation; and the relations cease as soon as the young quadruped can provide for itself. Preservation of offspring has been superinduced on self-preservation; but there is, as yet, no self-improvement: this is the peculiar attribute of mankind. The human species is characterised by the prolonged dependence of a slowly-maturing offspring on parental cares and affections; in which are laid the foundations of the social system, and time given for instilling those principles on which man's best wisdom and truest happiness are based, and by which he is prepared for another and higher sphere of existence. In this destination alone may we discern an adequate end and purpose in the great organic scheme developed upon our planet."

One of the most recent and extraordinary additions made to Natural History, is the gorilla. For about two centuries, says Mr. Owen, naturalists have been cognizant of a small ape, tailless, without cheek-pouches, and without the ischial callosities; clothed with black hair; with a facial angle of about 60°, and of a physiognomy milder and more human-like than in the ordinary race of monkeys—less capricious, less impulsive in its habits, more staid and docile. This species, brought from the west coast of Africa, is that which our anatomist, Tyson, dissected. He described the main features of its organisation in his work published in 1699. He called it the Homo Sylvestris, or Pigmy. It is noted by Linnæus in some editions of his *Systeme Naturæ*, as the Homo Troglodytes. Blumenbach, giving a truer value to the condition of the innermost digit of the hind foot, which was like a thumb, called it the Simia Troglodytes: it afterwards became more commonly known as the "Chimpanzee." At a later period, naturalists became acquainted with a similar kind of ape, of quiet, docile disposition, with the same sad, human-like expression of features. It was brought from Borneo, or Sumatra, where it is known by the name of Orang, which, in the language of the natives of Borneo, signifies man, with the distinctive addition of Outan, meaning "wood man," or "wild man of the woods." This creature differed from the Pigmy, or Simia Troglodytes of Africa, by being covered with hair of a reddish brown colour, and by having the anterior, or upper, limbs much longer in proportion, and the thumb upon the hind feet somewhat less. It was entered in the zoological catalogue as the Simia Satyrus. A governor of Batavia, Baron Wurmb, had transmitted to Holland, in 1780, the skeleton of a large kind of ape, tailless, like this small species from Borneo, but with a much-developed face, and large canine teeth, and bearing thick callosities upon the cheeks; giving it, upon the whole, a very baboon-like physiognomy; and he called it the Pongo.

The additional facts subsequently ascertained respecting the gorilla, although they prove its nearer approach to man than any other tailless ape, have not, in any degree, affected or invalidated the conclusions at which Mr. Owen then arrived. Since the date of that memoir, skeletons, and the entire carcass, preserved in spirits, of the gorilla, have successively reached the museums of Paris, Vienna, and London; and have formed the subjects of several memoirs, the results of the recorded observations differing only in regard to the interpretation of the facts.

Dr. Wyman, the accomplished anatomical professor of Boston, U.S., agrees with Mr. Owen in referring the gorilla to the same genus as the chimpanzee; but he regards the latter as more nearly allied to the human kind.

Professors Duvernoy and Isidore Geoffroy St. Hilaire consider the differences in the osteology, dentition, and outward character of the gorilla to be of generic importance; and they enter the species, in the zoological catalogues, as Gorilla Gina, the trivial name being that by which the animal is called by the natives of Gaboon. The French naturalists also concur with the American in placing the gorilla below the chimpanzee in the zoological scale; and some have, more lately, been disposed to place both below the siamangs, gibbons, or long-armed apes (Hylobates).

The following are the principal external characters of the gorilla, exhibited by the specimen preserved in spirits, which was received, in 1858, at the British Museum, and is now mounted and exhibited in the Mammalian gallery. Mr. Owen's attention was first attracted by the shortness, almost absence, of neck, due to the backward position of the junction of the head to the trunk, to the great length of the cervical spines, causing the "nape" to project beyond the "occiput"—to the great size and elevation of the scapulæ, and to the oblique rising of the clavicles from their sternal attachments to above the level of the angles of the jaw. The brain-case, low and narrow, and the lofty ridges of the skull, make the cranial profile pass in almost a straight line from the occiput to the super-orbital ridge, the prominence of which gives the most forbidding feature to the physiognomy of the gorilla, the thick integument overlapping that ridge forming a scowling pent-house over the eyes. The nose is more prominent than in the chimpanzee or orang-outan, not only at its lower expanded part, but at its upper half, where a slight prominence corresponds with that which the author had previously pointed out in the nasal bones. The mouth is very wide; the lips large, of uniform thickness, the upper one with a straight, as if incised margin, not showing the coloured lining membrane when the mouth is shut. The chin is short and receding; the muzzle very prominent. The eyelids with eyelashes; the eyes wider apart than in the orang or chimpanzee: no defined eyebrows; but the hairy scalp continued to the super-orbital ridge. The ears are smaller in proportion than in man. On a direct front view of the face, the ears are on the same parallel with the eyes. The huge canines in the male give a most formidable aspect to the beast: they were not fully developed in the younger and entire specimen now mounted. The profile of the trunk describes a slight convexity from the nape to the sacrum, there being no inbending at the loins, which seem wanting, the thirteenth pair of ribs being close to the "labrum ilii." The chest is of great capacity; the shoulders very wide across; the pectoral regions are slightly marked, and show a pair of nipples placed as in the chimpanzee and human species. The abdomen is somewhat prominent, both before and at the sides. The pelvis relatively broader than in other apes.

The chief deviations from the human structure are seen in the limbs, which are of great power, the upper ones prodigiously strong. The arm, from below the short deltoid prominence, preserves its thickness to the condyles; a uniform circumference prevails in the fore-arm; the leg increases in thickness from below the knee to the ankle. There is no "calf" of the leg. These characters of the limbs are due to the partial muscular enlargements which impart the graceful varying curves to the outlines of the limbs in man. Yet they depend rather on excess than defect of development of the carneous as compared with the tendonous parts of the limb-muscles, which thus continue of almost the same size from their origin to their insertion, with a proportionate gain of strength to the beast.

Gorilla-land is a richly wooded extent of the western part of Africa, traversed by the rivers Danger and Gaboon, and extending from the equator to the 10th or 15th degree of south latitude. The part where the gorilla has been most frequently met with, presents a succession of hill and dale, of heights crowned with lofty trees, and valleys covered with coarse grass, partial scrub or scattered shrubs. Fruit trees of various kinds abound both on the hills and in the valleys; some that are crude and uncared-for by the negroes, are sought out and greedily eaten by the gorillas; and as different kinds come to maturity, at different seasons, they afford the great denizen of the woods a successive and unfailing supply of these indigenous fruit trees. . . . . Fruits and other nutritious productions of the vegetable kingdom, constitute the staple food of the gorilla, as they do of the chimpanzee. The molar teeth, which alone truly indicate the diet of an animal, accord with the statements as to the frugivorous character of the gorilla; but they also sufficiently answer to an omnivorous habit, to suggest that the eggs and callow brood of nests, discovered in the trees frequented by the gorilla, might not be unacceptable. The gorilla makes a sleeping-place like a hammock, connecting the branches of a sheltered and thickly-leaved part of a tree by means of the long, tough, slender stems of parasitic plants, and lining it with the broad, dried fronds of palms, or with long grass. This hammock-like abode may be seen at different heights, from ten feet to forty feet from the ground, but there is never more than one such nest in a tree. . . . . They avoid the abodes of man; but are most commonly seen in the months of September, October, and November, after the negroes have gathered their outlying rice crops, and have returned from the bush to the village. So observed, they are described to be usually in pairs; or if more, the addition consists of a few young ones, of different ages, and apparently of one family. The gorilla is not gregarious. The parents may be seen sitting on a branch, resting the back against the tree-trunk—the hair being generally rubbed off the back of the old gorilla from that habit—perhaps munching their fruits, whilst the young gorillas are at play, leaping and swinging from branch to branch, with hoots or harsh cries of boisterous mirth. . . . If the old male be seen alone, or when in quest of food, he is usually armed with a stout stick, which the negroes aver to be the weapon with which he attacks his chief enemy, the elephant. Not that the elephant, directly or intentionally, injures the gorilla, but, deriving its subsistence from the same substances, the ape regards the great proboscidian as a hostile intruder. When, therefore, he discovers the elephant pulling down and wrenching off the branches of a favourite tree, the gorilla, stealing along the bough, strikes the sensitive proboscis of the elephant with a violent blow of his club, and drives off the startled giant, trumpeting shrilly with rage and pain.

Another peculiarity of the gorilla is his instinctive aversion to the whole of the negro race. No negro willingly approaches the tree in which the male gorilla keeps guard. When the young men of the Gaboon tribe make armed excursions into the forests in search of ivory, there is no enemy of which they stand in more fear than this formidable animal. If they have unawares come too near him with his family, he does not retreat, but comes rapidly to the attack, swinging down the branches, and clutching at the nearest foe, his aspect perfectly hideous with rage. If fired at, and not mortally wounded, he closes at once upon his assailant, and inflicts most dangerous, if not absolutely deadly, wounds with his tusks. Negroes, when moving through the tracts of their forests, are sometimes made aware of the presence of this animal by the momentary disappearance of one of their companions, who has been hoisted up into a tree, uttering, perhaps, a short suffocating cry. In a few minutes the unfortunate man drops to the ground a strangled corpse. The gorilla, watching his opportunity, has let down his enormous hind hand, seized the passing negro by the neck, pulled him up the higher branches, and dropped him when his struggles had ceased. The strength of the gorilla is so great as to make him a match for the lion, the leopard falling a comparatively easy prey to his power. The redeeming quality of the animal is the extreme care which both male and female take of their young. We will conclude this account of the gorilla with the following anecdote, for which we are, also, indebted to Mr. Owen's description of the peculiarities of this animal.

"It is reported that a French natural history collector, accompanying a party of the Gaboon negroes into the gorilla woods, surprised a female with two young ones on a large boabdad which stood some distance from the nearest clump. She descended the tree with the youngest clinging to her neck, and made off rapidly to the forest, and escaped. The deserted young one, on seeing the approach of the men, began to utter piercing cries. The mother, having disposed of her infant in safety, returned to rescue the older offspring; but before she could descend with it, her retreat was cut off. Seeing one of the negroes level his musket at her, she, clasping her young with one arm, waved the other as if deprecating the shot: the ball passed through her heart, and she fell with her young one clinging to her. It was a male, and survived the voyage to Havre, where it died on arriving."

One of the singularities of the animal kingdom is seen in the wonderful variety which appears in the construction of their feet. At first sight there is no obvious reason for the great difference between the foot of a horse and an ox; but when their separate destinations are examined, the adaptation of each construction becomes at once apparent. The horse was intended for rapid movements on hard ground—hence the construction of the hoof, to be in accordance with such a design. The place of the ox was to be in meadow lands and on river banks. Its destiny was, therefore, to tread on soft grounds; and for this purpose its divided, and consequently spreading, hoof is adapted. The horse sinks where an ox of greater weight can feed in safety. The sharp hoof of the goat is not less adapted for the rocky places and narrow footing of its mountain habitation; and the same general principle is extended to the sheep and other species for the same reason. On the other hand, the foot of the camel is a broad, elastic, and soft cushion, admirably adapted to those sands which every other peculiarity in its construction shows to have been its intended dwelling-place. The rabbit was designed to dig and to burrow; but it was also intended that it should run with considerable velocity. For these objects its fore-legs are short and strong, with a powerful hand; while the long metatarsal bone is rendered a foot to rest on, as it is a leg for running. It can thus compress itself into a narrow space; while the length of the lever behind, and the great flexibility of the spine, enable it to take a much longer step than its size would indicate, and thus contest in speed with its far larger enemies. In the hare, the intention to afford concealment by crouching, leads to the same construction, with the same effect; as in all the quadrupeds, the art of running, in so far as pace is concerned, depends solely on the hind legs, the others forming little more than a resting-place. The structure of the hind foot in the kangaroo, and its congeners, is an extension of the same contrivance, with a somewhat different practical result.

In the case of the mole, where digging and not running is required, we have the beautifully and powerfully formed hands. The legs are all extremely short, because longer ones would not only have been inconvenient, but useless; and there is the peculiarly shaped humerus, with a flat and long carpal bone, which, while the hand is enlarged in breadth, permits the palm to be turned outwards. The contrivance indicated in the foot of a cat is as singular as it is wonderful. The wants of the animal required a hand to seize, like the bird of prey; and this was to be combined with walking. Superficially viewed, the foot of the cat and dog are similar, and both walk on the ends of their toes. But though the dog's foot had been more flexible than it is, the wearing down of the claws by walking would have prevented it from securing an object. To protect those in the other animal, the last joint of each toe is reversed when the foot is used for walking, it being brought forward with its long claw when used as a hand for seizing, and returned to its place by an elastic ligament. In the lion the same object is effected, but in a different manner, by means of a lateral motion, which, like the peculiar form of the last phalanx in this tribe, does not well admit of description. Here, also, as in all animals with claws similarly strong, there is a peculiar contrivance for fixing these organs firmly in their sockets; a projection from it entering within the claw, while that is externally embraced in the usual manner. In the cat, also, designed as it is to prey on animals possessed in a high degree of acuteness, the sense of hearing, and endowed with the capability of extremely rapid movements, the sole of the foot is remarkably soft: whence, combined with an extraordinary pliancy of the whole body, that inaudible stealthy step, so universally known; while in the marten the same object is effected by a covering of hair.

In both the mouse and the rat we see other peculiarities which fill us with surprise. These animals can, without difficulty, walk on surfaces not horizontal, by means of the sharpness of their claws, united to the smallness of their forms, the lightness of their weight, and their great muscular strength. The walrus, as ponderous as it is inactive, when desirous of leaving the sea, is forced to clamber over smooth and inclined rocks, which it is enabled to do by the sole of its foot being constructed in such a manner as to produce a vacuum with the surface. The interest, however, attached to this contrivance is increased by observing how the general principle by which it is effected is varied in different animals. In the walrus, where the toes were destined to exist, the muscles enable them to form a vacuum, which may also be done, though imperfectly, by the human hand. In the foot of the gekko, each toe has transverse cavities opening by slits below, which can, by muscular action, be converted into vacuums; but, in the common fly, which, by this means, can easily ascend a pane of glass, there are cushions, agreeing with the general structure of insects, and producing the same effect. In the *Bufo Calavicta* the same power is obtained by a tubercular arrangement, and, in various sorts of lizards, by cushions or scales.

Turning from beasts to birds, we find a more complete general view of a regular system of variations applied to one principle of construction, and each distinctly adapted to the particular destination of the birds. If the most general purpose is that of walking on ordinary ground, so is the basis of this contrivance familiar in the domestic fowl, and in many other birds. But a considerable change is made when it becomes necessary to climb trees, as in the woodpecker and others. In these cases, two of the claws, instead of one, are directed backwards, and thus a support in this difficult position is obtained; while the foot of the parrot thus becomes a hand also. And the power of turning the outer toe backward or forward appears intended to give equal facility in roosting and in seizing; while we see the utility of this double power very strikingly exemplified in the owl. The talons of the falcon tribe are rendered hands by furnishing the toes with long and curved claws. In the swimming birds, these are so connected by the web that they become paddles, and thus are enabled to perform a double office. And in this case there is an evident intention to save muscular power; since the simple flexion of the heel-joint is the only exertion required, the paddle shutting and opening by the mere pressure of the water. In the semi-palmated birds there is an interesting variation of this subsidiary contrivance. It is a sufficient paddle in the coot and the water-hen, while it also assists them in walking on soft bogs, and is not interfered with by asperities, as the entire webbed foot might be.

The length of leg, and the barrenness above the hock-joint in the wading birds, is a variation for the sake of those which do not require to swim, or could not, because their prey lies in shallow waters. If the heron is a familiar example, it must be pointed out that the serrature in the claws enables it to grasp its slippy and active prey. It is a contrast to the bow-legged waders to find the ptarmigan feathered even over the feet; while the utility is equally seen in the habitation which it has been ordered to choose for itself among the snow. It is not a contrivance, but a peculiar application, to find that the sea-birds which lie without a nest on smooth rocks, use the foot as a hand, to retain their single egg in rising, lest their long wings should sweep it into the sea.

In the lobster and crab, considering these as insects, the hands, which serve as feet also, are well known. He who should examine the former, would decide that the two were designed for different uses; nor would he easily substitute a more efficacious piece of mechanism for that one which is used for cracking shell-fish, as the other is intended to tear flesh. Smaller and finer hands, or pincers, are allotted to other kinds, as they often also are found in many of the feet; though amid the species of this extensive tribe we do not frequently conjecture the uses. And in some of them a pair of feet, or more, are flattened, so as to resemble lancets; thus serving the purpose of swimming fins, as well as of feet for walking at the bottom of the sea.

In the insects proper, the purposes served by the feet are extremely multifarious, and frequently exceedingly particular. Among these are—walking on a great variety of substances and surfaces, often under the more appropriate terms of climbing and jumping; such as land under all its forms; above the water, and beneath it; water itself; smooth or polished planes of many kinds; leaves of all sorts and in all positions, at rest or in motion; fibres or hairs, which must be grasped by the foot; and even their own spun webs. Thus, also, are they hands for seizing prey in many different ways, for spinning, for digging, or for building, plastering, and more in those which execute peculiar works. In all these cases the constructions are equally various and perfect for their uses; the adaptations conformable to the destinations. As a few examples, we may point out the brushes on the feet of flies, where the intention is decidedly marked by their limitation to those which can be used as hands; the comb-shaped feet of the spider, intended for separating the threads in spinning; those of the louse, designed for grasping a single hair; and the not very dissimilar one of the grasshopper, applied to the very different purpose of picking up ants as it walks among them, while putting them into its mouth at every step, without any apparent effort, or even intention. Looking at the great length of the legs in the well-known fly, which receives its common name from this circumstance, it would seem impossible that it should make its way among the long grass which it inhabits; yet that construction has been adopted for this very purpose, with a peculiar additional variation, departing also from a very general rule, through which the tarsus is formed of a great number of joints, enabling it to bend round and to embrace those narrow leaves.

Passing from the feet, let us now consider what are the defences of animals. For the most of these illustrations we are indebted to an abridged article of Mr. Macculloch's *Proofs and Illustrations of the Attributes of God;* and we cannot too highly admire the light which, in a collected point of view, they throw upon the wonderful adaptation of certain forms to certain ends, produced by the great DESIGNER.

It is to be observed, that, under all forms, the sole defence of many land animals lies in their power of escaping from danger, even although weapons may be superadded to this. In the hare it is the defence against superior strength; the power of the fore-paws being efficient against the smaller enemies. In the deer tribe, it is the true, and, except under extreme danger, the only defence; in the equine family, and also in the camelopard, the instinct and the power to use their hoofs are superadded. In the natural state, the speed of the sheep, aided by the vigilance of a posted sentinel, and added to a power of climbing like the goat, where few animals can follow it, constitute the general defence against single animals of prey. The instinct to fly is always added to the power of escape; so regularly are powers and propensities associated in the great scheme of nature.

Birds generally are endowed with few weapons of defence. Such as they have, however, serve their purpose, and consist of spurs on the legs, seldom on the wings, and still more seldom on the head, though they seem designed for the same peculiar use as the horns of the deer, belonging to the polygamous tribes. The power of flying is an ample defence against the purely terrestrial animals, as it is such even against the carnivora. A very small number only in the falcon family have the power of taking their prey on the wing; and even this they do with considerable difficulty.

Flight is also the principal mode of defence in such insects as are endowed with wings; while the rapidity of their angular motions renders it effectual as a safeguard against most of their enemies. Few except the bat, the swallows, and the night-hawk, with their own peculiar foe, the dragon-fly, are able to skim the air with them; and neither of these would succeed in securing them, were it not for other means which they have at command. In fishes, the power of swimming with extraordinary velocity is also the prevailing mode of defence, although many of them are endowed with other means. In them this power becomes especially effective, from the disposition of colour, which renders them invisible; by changing their level with respect to the pursuer; and from the imperfect vision, at long distances, which follows from the deficiency of light in the sea. Perceiving, also, that the more voracious fishes are ill-constructed for rapid motions; while the smaller species of the shark tribe, though better formed, are extremely sluggish.

If velocity is a passive system of defence, concealment is another. In the rabbit, the badger, the fox, and other animals, this is generally known; and it is given to some birds, as in the cases of the sand-swallows and the puffin. The owl of South America burrows with the *Lepus viscaccior;* and many animals which do not burrow take up their abodes in natural crevices and caverns. This is especially the case with the fox (exhibiting the power of reason over instinct), which will not dig provided a convenient hole can be found without digging. The excavation made by a sparrow, the nests of the wren and the swallow, and the much more remarkable suspended nests in hot climates, are other instances of united defence and dwelling which Natural History can easily extend, and which will be found recorded in their proper places in the following work. Among fishes, the burrowing of the eel and others may be simply the pursuit of food; but the flat fishes conceal themselves in this manner under alarm, and with great rapidity. That the inhabitants of weedy and rocky shores make use of this defence is well known to fishermen; and very remarkably in the case of the loach, enticed from its hole by music; as seems also to take place in the case of the trout. It requires all the silence and cunning of the oyster-catcher to surprise the limpet; and nothing short of the vegetable patience of the actinia could continue to insinuate a tentaculum within the obstinate cover of a periwinkle. The razor-fish and the cockle burrow in addition, safe from all but the sand-eel; and the pholades, with shells too feeble and too open for defence, are protected in the caverns which they have been taught to excavate in the rock.

In the crustaceous marine animals, and in insects, the same mode of defence prevails. The shells are more than habitations, since they are, to the animal, both skin and bone; but they are frequently defences besides; and, as such, very effectual. The cod swallows a small crab, but it cannot break the shell of that which is too large for its mouth. The beetle tribe very widely may be trod on without injury; and we rarely kill an ant by walking over their armies, unless it be on a very smooth and hard gravel-walk. The forest-fly defies the strength of a muscular hand; besides which, we find among these the system of burrowing, and that of concealment in natural cavities or otherwise, very widely spread. The crab burrows in the sand; the lobster hides itself in the crevices of rocks, in addition to the security derived from its hard covering and defensive weapons. Thus, also, do the brown shrimps conceal themselves in the mud, and the horned ones among the weeds; and this mode of concealment pervades all the lower marine tribe very widely.

In insects proper, or rather in the parent worm, the structures formed by some of the sub-aquatic larvæ out of gravel or fragments of sticks, are the most remarkable, being habitations, and also defences. The sabella, uniting sand in the same manner, may be associated with these. The hermit crab may, likewise, take its place here, since the empty shell which it chooses is equivalent to the den of the fox: but the burrowing insects and worms are so numerous that no examples need here be given. To hide themselves in this manner, or in natural crevices, may be viewed as a sort of universal defence for the race at large.

Colour is another means of defence, acting as a concealing power; and it is the most universal, pervading as it does all the races of animals. In the hare its efficacy is familiar to all sportsmen and poachers. In quadrupeds generally, however, it is much less depended upon than it is in the birds, where it appears designed to deceive predatory animals of their own species, rather than those which are confined entirely to the earth. In the partridge, the quail, the woodcock, the snipe, and other species, the conformity of the colours to the ground is such as to conceal the animal from every eye—even from the acute sight of his enemies, the kite and the hawk. Thus do the smaller birds deceive them, even where the apparent conformity of colour is not great; since we often see the hovering hawk abandon its pursuit, although the expected prey has not escaped. Under this system of defence, as under all other systems, the animals seem perfectly informed of its nature and value, as the chameleon is in its voluntary changes of tint; and thus apparently do the lark and other small birds shift their position under the hawk's eye, till they find the colour which they know to be efficacious.

The same kind of defence has been bestowed upon fishes. In the whole of these the under part is white, while the upper is covered in some manner; or the exceptions at least are rare, occurring, also, in those which seem to have their habitat among sea-weeds, where the purpose of colouring the whole body is the same. In the high-swimming kinds, moreover, the whiteness beneath is brilliant; while it becomes a dead and dull one in those which seek the bottom, or are compelled to reside there. The object of the variation, as well as of the primary contrivance, is apparent on reflecting that the enemy from below views them against the light of the sky, and that this light diminishes in intensity as it passes through a body of water. It is probable that the fishes can as little see each other in this direction, as we can discern them from above.

Colour in insects is frequently the only defence they possess. The grasshoppers, green caterpillars, and amphides are among the most obvious examples, as their principal foes are the birds. But the contrivances for concealment are even carried further in some insects, enabling them to imitate form as well as colour. Some caterpillars erect a part of their body when adhering to a tree, so as to bear a striking resemblance to buds, or the stumps of branches; another is so like the black flowers of the sedges on which it reposes, that the sharp-sighted birds often pass it over. Others resemble a dry leaf; while every collection displays those singular imitations of leaves and sticks, which occur, among others, in the phasma.

There are numerous and various modes of concealment analogous to those we have mentioned. For example, many insects cover themselves with sand, chalk, dust, or other substances, which enables them thus to escape notice. Some of them, also, use these masks for the purpose of ensnaring their prey. A domestic cimex dresses itself in fragments of feathers and wool; the cancer phalangium cuts off the leaves of a small fucus, and fixes them on its long hairs, so that even a practical botanist may take it up as a specimen of the plant. In this case, however, the purpose seems to be rather stratagem than defence: it is a trap for shrimps; but it is applicable to both objects. The following history must, however, be consulted on the subject of stratagems, where the reader will find sufficient alike to stimulate curiosity and inspire wonder.

Turning from these generalities, we cross the Atlantic, and land on a continent teeming with animal life of almost every description. Here the first object that arrests attention is the jaguar—the panther of the American forests—and, in fierceness, all but equalling the tiger of the Indian jungles. Humboldt heard the yell of this animal from the tops of the trees, succeeded by the sharp, shrill, long whistle of the terror-stricken monkeys as they fled from its destructive approach. It captures birds in their nests, and fish in the shallows; and in some districts, the havoc it makes among horses, cattle, and sheep, is terrible. So great are the numbers of these beasts in the Spanish colonies, that, according to Humboldt, at one time 4,000 were annually slaughtered, and 2,000 skins exported from Buenos Ayres only. The empty shells of turtles were pointed out to him as having been cleared of their contents by the jaguar, which watches the turtles as they come to the sandy beaches to lay their eggs, pounces upon them, and turns them on their backs; he then insinuates his paw between the shells, and scoops out the contents as clean as if the operation had been performed with a knife. As he turns many more than he can devour at a meal, the Indians often profit by his dexterity. The eggs of the turtle are often dug out of the sand, and devoured; and young turtles, on their way to the water, are also abundantly destroyed.

Another animal of the feline species found on this continent is the puma, or American lion. It is spread throughout both North and South America; but it is now less abounding than formerly, and its range is much more circumscribed. As civilisation fells the forest, this must always be the case. The wild animal must retreat before the power of the axe, and seek its home in those umbrageous recesses which it is its nature to inhabit. Though naturally savage and ferocious, this beautiful animal is easily tamed, and, in a short time, enters with man into terms of familiarity. Edmund Kean, the great tragedian, possessed one which was perfectly domesticated. In its wild state, however, its propensities are very destructive. Sir Francis Head, in his *Journey Across the Pampas*, furnishes the following interesting narrative, in proof of the dread which this animal, in common with others of a similar savage nature, has of the power of man. The person who related the anecdote to Sir Francis was himself the principal in the scene.

"He was trying to shoot some wild ducks; and, in order to approach them unperceived, he put the corner of his poncho (a sort of long narrow blanket) over his head, and crawling along the ground upon his hands and knees, the poncho not only covered his body, but trailed along the ground behind him. As he was thus creeping by a large bush of reeds, he heard a loud sudden noise, between a bark and a roar; he felt something heavy strike his feet, and instantly jumping up, he saw, to his astonishment, a large lion actually standing on his poncho; and, perhaps, the animal was equally astonished to find himself in the immediate presence of so athletic a man. The man told me he was unwilling to fire, as his gun was loaded with very small shot; and he, therefore, remained motionless, the lion standing on his poncho for many seconds. At last the creature turned his head, and walking very slowly away about ten yards, he stopped and turned again. The man still maintained his ground, upon which the lion tacitly acknowledged his supremacy, and walked off."

Audubon, in his *Ornithological Biography*, gives a spirited account of the chase of a puma with dogs, and men armed with rifles. It was driven, by their united exertions, from tree to tree, and died combating the dogs, having first received several balls, one of them producing a mortal wound. On the Pampas the puma is hunted with dogs; and while it is engaged in the conflict, surrounded by them, the dexterous Gaucho strikes him senseless with his bolas, and throws his lasso over him, and, galloping off, drags him after him till his life is nearly extinct, when the dogs rush in, and tear him to pieces. There are other species of the Felidæ on the continent of America; but as they are described in their proper place in the following work, nothing need be said of them here.

A sub-division of Felidæ are the lynxes, of which there are several species in America, as well as in Europe. The genus Didelphis, however, of which the Virginian opossum is an example, is confined to America. Quoting from the following work, we find that there is nothing pleasing either in the appearance or the habits of the Virginian opossum. In captivity it is slothful in the extreme, and becomes inordinately fat, eating both animal and vegetable diet. Whatever may be its cunning in a state of liberty, it evinces but little intelligence when caged in our climate, but appears to be a compound of indolence and apathy, not unmixed with timidity. In its native woods, it suffers from the attacks of birds and beasts of prey; it is also hunted by man for the sake of the flesh and fat. As soon as the opossum discovers the approach of his enemies, he lies perfectly close to the branch, or places himself snugly in the angle where two limbs separate from each other. The dogs, however, announce the fact of his presence by their baying, and the hunter, ascending the tree, shakes the branch upon which the animal is seated with great violence, so as to alarm and cause him to relax his hold. In this way, driven from branch to branch, he is obliged, at last, to drop to the ground, where, unless the dogs are vigilant, it escapes; for, as it is asserted, it steals slowly and quietly to a little distance, and gathering itself up into a small compass, assumes the stillness and the appearance of death. This artifice, under the obscurity of night, and amidst dense, rank herbage, or tangled underwood, often proves successful. In the *Perfect Description of Virginia* (1649), it is noticed as a beast that hath "a bagge under her belly, into which she takes her young ones if at any time frightened, and carries them away." Lawson states that the *opossum* is found nowhere but in America. She is the wonder of all the land animals, being the size of a badger, and nearly of the same colour. "The female doubtless rears her young at her teats," he says; "for I have seen them stick fast thereto, when they have been no bigger than a small raspberry, and seemingly inanimate. She has a paunch or false belly, wherein she carries her young after they are from those teats, till they can shift for themselves. Their food is roots, poultry, or wild fruits. They have no hair on their tails, but a sort of scale or hard crust, as the beavers have. If a cat has nine lives, this creature surely has nineteen; for if you break every bone in their skin, and mash their skull, leaving them for dead, you may come an hour after, and they will be gone quite away, or perhaps you may meet them creeping away. They are a very stupid creature, utterly neglecting their safety. They are most like rats of anything. I have, for necessity, in the wilderness, eaten them. Their flesh is very white and well tasted; but their ugly tails put me out of conceit with that fare. They climb trees as the racoons do. Their fur is not esteemed or used, save that the Indians spin it into girdles and garters. The prehensile power of the tail serves the animal in more ways than one; for it is stated that the little ones, when advanced in growth, leap upon their mother's back if they are frightened, and, twisting their tails round her's, escape, with her assistance, the threatened danger."

The marsupial animals are confined to two portions of the globe—namely, America and Australia, comprising certain islands in the Indian Archipelago. The American species were the first known to European naturalists; and, indeed, the only ones with which Linnæus was acquainted. Captain Cook introduced the kangaroo of Australia to science; and subsequent researches, in that region, have made us now familiar with both its fauna and flora.

The sloths are another extraordinary family belonging to America. It is in the immense forests of the south where they are principally found, and whence the bones of the extinct megatherium and mylodon were exhumed, and submitted to the examination of Professor Owen. Respecting these animals, this philosophic naturalist observes, that "they illustrate the affinity or tendency to the oviparous type, by the supernumerary cervical vertebræ supporting false ribs, and by the convolution of the windpipe in the thorax in the three-toed species; by the lacertine (lizard-like) character of three-and-twenty pairs of ribs in the unau; and by the low cerebral development; by the great tenacity of life, and long-enduring irritability of muscular fibre in both species." In its proper place, a full and most interesting description of this family will be found in the following work; but we may here observe that, in their habits, they are exclusively arborial, living upon the foliage of trees, and haunting the depths of the immense forests of South America. "It is not long since that the sloth was condemned as a degraded, miserable being; slow and embarrassed in all its movements, and wretchedly framed, as if Nature had bungled in its creation. Inconsistent with philosophy, and presumptuous in the extreme, is such an opinion. The tall giraffe, and the sinewy-limbed antelope, are not more directly organised for their respective requirements, than is the sloth for its appointed place in the scale of creation. Were it a terrestrial animal, then, indeed, might we call its structure defective; but its mode of life taken into consideration, we view it in another light, and perceive that it affords a marked example of design and purpose." The sloth feeds by clinging to, and travelling along, the branches of trees. According to Mr. Burchell, the buds and young shoots of a species of cecropia form its principal food. These trees grow only in damp places, and rise with a slender stem to the height of thirty or forty feet, giving off horizontal branches, hollow internally, except at the extremities. Along these branches it travels, and the young cling round the body of the mother. It would appear that the moisture of leaves or buds suffices the sloth for drink, as none kept by Mr. Burchell took liquid in any other way. In the aspect of the sloth there is an expression of profound melancholy: it seldom utters any cry; it notices nothing with any positive mark of attention, except, perhaps, the trees, to which unerring instinct draws it; nor by any action evinces much intelligence. Slothful and inoffensive, however, as this animal may appear to be, it is quite capable of defending itself when attacked. The weapons which it uses for this purpose are its arms, which, from the manner in which they are employed to obtain food, are necessarily of no little power. When assailed on the ground, it throws itself on its back, fixes its claws in the adversary, and grasps him with enormous strength. In this manner it has been known to strangle a dog, holding him all the while at arm's length; and in the same way grapples with snakes of large size, and with the attacks of which it is said to be familiar.

Another singular class of animals come under the name of *Mephitis Americana*, of which there are several species. Among them are the Skunk, Mephitic Weasels, Bêtes Puantes, Enfans du Diable, &c. These are all natives of America, and are a genus intermediate between the polecats and the badgers. They are notorious for the intolerable odour of the secretion of their glandular pouches, which neither man nor dog can endure. The head is small; the snout pointed; the body robust, and covered with long, coarse hair; the tail rather long, and very bushy. The general colour of the upper surface is white, interrupted by a stripe, more or less broad, of black along the spine; the limbs and under surface are black. According to Kalin, the skunk of North America "brings forth its young in the hollows of trees, and in burrows; it is not confined to the ground, but climbs trees; it is an enemy to birds; it destroys their eggs, and also devours their young; and when it can enter the poultry-roost, it makes great destruction. When it is chased, either by men or dogs, it runs as far as it can, or climbs a tree; but when it finds itself hard pressed, it ejects its fluid against its pursuers. The odour of this is so strong as to suffocate. If a drop of this pestilential secretion falls in the eye, it is at the risk of losing its sight; and when it falls on the clothes, it communicates an odour so powerful, that it is very difficult to get rid of it: most dogs fear to attack it, and flee when touched by a drop." In the following work full details of all that relates to the genus will be found. It is now time, however, that we should quit the earth to make a few observations on some of those beautiful, lively, and attractive creatures that "wing the air."

There is, perhaps, no portion of creation in which more spirited life and varied loveliness are found than among the feathered tribes. Considering a bird from its beginning, what a wonderful piece of mechanism it is? Even its feathers are a marvel; but when we think of its instincts, its intelligence, its perception, and the general capacities with which it is endowed for carrying out the great ends of its being, it is impossible not to perceive, and even *feel*, the inscrutable power that conceived and made it. Whether we take a lark or an eagle, a peacock or a humming-bird, our astonishment is excited to the utmost degree when we consider that they each and all come from that mysterious thing designated an egg. The feathered tribes which people and adorn the earth and the air are innumerable; whilst the beauty and splendour of their plumage is, in thousands of instances, unrivalled. There are no beings more sensible of the cheering influence of the spring than birds are. Their whisking wings and thrilling throats throw the balmy air into a state of commotion. Whilst some are picking up the dry grass, others are gathering bits of scattered and broken sticks: whilst some are pulling pieces of lichen from the barks of trees, others are collecting stray feathers and hairs. Some are under the shrubbery, capturing snails which would become the despoilers of the garden; while others are inspecting the buds in the orchard, and picking off every one that contains a caterpillar or a nest of eggs. The rooks are clearing the meadows of the young cockchafers, which the heat has brought near the surface, and which would destroy the grass; and the sea-gull comes from a distance to clear the fields of "animal weeds," while the vegetable ones are being turned down by the plough. All are busy in their respective pursuits, and all are following the laws of nature. Of the peculiarities of some of these creatures, Audubon gives the following instance. He is speaking of the woodpecker.

"While in the great pine forest of Pennsylvania, of which I have repeatedly spoken, I was surprised to see how differently this bird worked on the bark of different trees, when searching for its food. On the hemlock and spruce, for example, of which the bark is difficult to be detached, it used the bill side-ways, hitting the bark in an oblique direction, and proceeding in close parallel lines; so that when, after a while, a piece of the bark was loosened and broken off by a side-stroke, the surface of the trunk appeared as if closely grooved by a carpenter using a gouge. In this manner the pileated woodpecker, often in that country, strips the entire trunk of the largest trees. On the contrary, when it attacked any other sort of timber, it pelted at the bark in a straightforward manner, detaching a large piece by a few strokes, and leaving the trunk smooth, no injury having been inflicted upon it by the bill. This bird, when surprised, is subject to very singular and astonishing fits of terror. While in Louisiana, I have several times crept up to one occupied in searching for food on the rotten parts of a low stump only a few inches from the ground; when, having got so near the tree as almost to touch it, I have taken my cap, and suddenly struck the stump, as if with the intention of securing the bird, on which the latter instantly seemed to lose all power or presence of mind, and fell to the ground as if dead. On such occasions, if not immediately secured, it soon recovers, and flies off with more than its usual speed. When surprised while feeding on a tree, they now and then attempt to save themselves by turning round the trunk or branches, and do not fly away unless two persons be present, well knowing, it would seem, that flying is not always a sure means of escape. If wounded without falling, it mounts at once to the highest part of the tree, where it squats and remains in silence. It is then very difficult to kill it; and sometimes, when shot dead, it clings so firmly to the bark that it may remain hanging for hours. When winged and brought to the ground, it cries loudly on the approach of its enemy, and essays to escape by any means in its power, often inflicting a severe wound if incautiously seized."

Of the passenger, or wild pigeons of America, their numbers are incalculable. The same writer says, that in passing over the Barrens, on the banks of the Ohio, a few miles below Hardensburgh, "I observed the pigeons flying from north-east to south-west in greater numbers than I thought I had ever seen them before; and feeling an inclination to count the flocks that might pass within the reach of my eye in one hour, I dismounted, seated myself upon an eminence, and began to mark with my pencil, making a dot for every flock that passed. In a short time, finding the task which I had undertaken impracticable, as the birds poured on in countless multitudes, I rose, and counting the dots then put down, found that 163 had been made in twenty-one minutes. I travelled on, and still met more the further I proceeded. The air was literally filled with pigeons; the light of noonday was obscured as by an eclipse; and the continued buzz of wings seemed to lull the senses.

"It is extremely interesting to see flock after flock performing exactly the same evolutions which had been traced in the air by the preceding flock. Thus should a hawk have charged on a group at a certain spot, the angles, curves, and undulations that have been described by the birds in their efforts to escape from their enemy, are undeviatingly followed by the next group that comes up.

"It may not, perhaps, be out of place to attempt an estimate of the number of pigeons contained in one of these mighty flocks, and of the quantity of food daily consumed by its members. Let us take a column of one mile in breadth, which is far below the average size, and suppose it passing over us without interruption for three hours together, this will give us an oblong square of 180 miles by one, covering 180 square miles. Allowing two pigeons in the square yard, we have one billion one hundred and fifteen millions and thirty-six thousand in one flock! As every pigeon daily consumes half a pint of food, the quantity necessary to supply this vast multitude must be eight millions seven hundred and twelve thousand bushels a day. The flights of the wild pigeons are entirely caused by the necessity of procuring food, and are not performed with the view of escaping the severity of a northern latitude, or of seeking a southern one for the purpose of breeding. They, consequently, do not take place at any fixed period or season of the year. Indeed, it sometimes happens, that a continuance of a sufficient supply of food in one district, will keep these birds absent from another for years."

Let us now inspect their place of nightly rendezvous. "Arriving on the spot nearly two hours before sunset, few pigeons were then to be seen; but a great number of persons, with horses and waggons, guns and ammunition, had already established encampments on the borders. Two farmers, from the vicinity of Russellsville, distant more than a hundred miles, had driven upwards of three hundred hogs to be fattened on the pigeons that were to be slaughtered. Here and there, the people employed in plucking and salting what had already been procured, were seen sitting in the midst of large piles of these birds. Many trees, two feet in thickness, were broken off at no great distance from the ground; and the branches of many of the largest and tallest had given way, as if the forest had been swept by a tornado. Everything proved that the number of birds resorting to this part of the forest must be immense beyond conception. As the period of their arrival approached, their foes anxiously prepared to receive them. Some were furnished with iron pots containing brimstone; others with torches of pine-knots; many with poles, and the rest with guns. The sun was lost to view, yet not a pigeon had arrived. Everything was ready, and all eyes were gazing on the clear sky, which appeared in glimpses amid the tall trees. Suddenly there burst forth a general cry of 'Here they come!' The noise which they made, though yet distant, reminded me of a hard gale, at sea, passing through the rigging of a close-reefed vessel. As the birds arrived and passed over me, I felt a current of air that surprised me. Thousands were soon knocked down by the pole-men. The birds continued to pour in. The fires were lighted, and a magnificent, as well as wonderful and almost terrifying, sight presented itself. The pigeons, arriving in thousands, alighted everywhere, one above another, until solid masses, as large as hogsheads, were formed on the branches all around. Here and there the perches gave way under their weight, with a crash, and, falling to the ground, destroyed hundreds of the birds beneath, forcing down the dense groups with which every stick was loaded. It was a scene of uproar and confusion. I found it quite useless to speak or even to shout to those persons who were nearest me. Even the reports of the guns were seldom heard; and I was aware of the firing only by seeing the shooters re-loading. No one dared venture within the line of devastation.

"The hogs had been penned up in good time; the picking up of the dead and wounded being left for the next morning's employment. The pigeons were constantly coming, and it was past midnight before I perceived a decrease in the number of those that arrived. The uproar continued during the whole night. Towards the approach of day, the noise, in some measure, subsided; and long before objects were distinguishable, the pigeons began to move off in a direction quite different from that in which they had arrived the evening before; and at sunrise, all that were able to fly had disappeared. It was then that the authors of all this devastation began their duty among the dead, the dying, and the mangled. The pigeons were picked up, and piled in heaps, until each had as many as he could possibly dispose of; then the hogs were let loose to feed on the remainder."

This, though a wonderful, is, notwithstanding, a shocking scene; but we cannot resist a feeling of astonishment at the vast multitude of life as exhibited in only one species of birds.

Birds are either insectivorous, carnivorous, granivorous, or omnivorous, and their digestive apparatus is modified accordingly. The crop is an expanded sac at the termination of the gullet, leading by a canal into a second enlargement, the commencing portion being encompassed by a zone of glands, pouring out a solvent in gastric juice. This part, in granivorous and many other birds, conducts to the gizzard, which is composed of two firm voluminous muscles surrounding a cavity lined with a thick, tough membrane. These muscles exert a sort of opposite grinding motion, with pressure on each other, like two mill-stones, and the effect is a reduction of grain and other vegetable matter into a pulpy mass; but this cannot be done without a number of pebbles, or coarse particles of sand, are swallowed with the food (especially in granivorous birds), which, by the working of the mills, triturate the food among them. In mollusk-feeding ducks, the gizzard is enormously powerful, grinding down hard and sharp shells. In carnivorous birds there is no gizzard. All birds are oviparous; that is to say, they produce eggs, which are hatched by incubation, and from which the young are excluded in different degrees of development; those of the gallinaceous and duck tribes being the most matured. They are, indeed, capable of running about and picking food in the course of a few hours. Their individual peculiarities are amply set forth in the following pages; which, with the numerous accompanying illustrations, fill the mind with the most correct ideas of their general appearances, as they are found in a state of wild nature or domestication.

One of the most charming features in the dispositions of birds, is the love which they show for their young until they are able to provide for themselves. "I was lately exceedingly pleased," says the *Journal of a Naturalist*, "in witnessing the maternal care and intelligence of a bird of the *parus* tribe; for the poor thing had its young ones in the hole of a wall, and the nest had been nearly all drawn out of the crevice by the paw of a cat, and part of its brood devoured. In revisiting its family, the bird discovered a portion of it remaining, though wrapped up and hidden in the tangled moss and feathers of their bed; and it then drew the whole of the nest back into the place whence it had been taken, unrolled and resettled the remaining little ones, fed them with the usual attentions, and, finally, succeeded in rearing them. The parents of even this reduced family laboured with great perseverance to supply its wants, one or the other of them bringing a grub, caterpillar, or some insect at intervals of less than a minute through the day, and probably, in the earlier part of the morning, more frequently; but if we allow that they brought food to the hole every minute for fourteen hours, and provided for their own wants also, it will admit of, perhaps, a thousand grubs a day for the requirements of one, and that a diminished, brood, and give us some comprehension of the infinite number requisite for the summer nutriment of our soft-billed birds, and the great distances gone over, by such as have young ones, in their numerous trips from hedge to tree in the hours specified, when they have full broods to support. A climate of moisture and temperature like ours is peculiarly favourable for the production of insect food, which would, in some seasons, be particularly injurious, were we not visited by such numbers of active little friends to consume it." Yet it was but a few years ago that almost the whole of the rustic population of France, and a great portion of the same sort of population in England, were waging a war, not of partial destruction, but of complete annihilation, against these diminutive and inoffensive grub-eaters—the preservers of much of our corn crops, although, mayhap, the destroyers of some of our fruits.

Not the least interesting objects associated with birds are the nests they build, especially those pensile or pendent ones, of which we believe there are no specimens to be found belonging to the architecture of British birds. Some curious specimens of these, however, may be seen in the British Museum. Several of them are either thickly clustered together, or hang alone. Of the former, the most remarkable is that of the African pensile grosbeak, of which from five to six hundred have been seen depending from one tree. The grosbeak's nest is a sort of basket of straw and reeds, in the shape of a bag, with the entrance below. It is secured to the twig of a tree, and usually overhangs a stream. The birds continue, from year to year, to hang one nest from another; so that, at last, they increase to a chain of five or six, suspended from one twig over the stream.

In Southern Africa there are several varieties of the finch tribe, which suspend their nests from the branches of trees, especially when they happen to impend over a river or precipice. It is supposed that the object of this precaution is to secure their young from the assaults of their many enemies, especially those of the serpent race. If we visit Hindostan, we find the baya, or bottle-crested sparrow, in most parts of that peninsula, where it is alike remarkable for its brilliant plumage, wonderful sagacity, and pendent nest. The nests are formed in a very ingenious manner, by long grass woven together in the shape of a bottle, and suspended by the other end to the extremity of a flexible branch, the more effectually to secure the eggs and young brood from serpents, monkeys, squirrels, and birds of prey.

The most celebrated of the pendent nests, however, is that of the Baltimore starling: speaking of which, Wilson, in his *American Ornithology*, says—"Almost the whole genus of orioles belong to America; and, with few exceptions, build pensile nests. Few of them, however, equal the Baltimore starling in the construction of these receptacles for their young. . . . . I have a number of their nests now before me, all completed, and with eggs. One of these, the neatest, is in the form of a cylinder, of five inches diameter, and seven inches in depth. . . . . This nest was hung on the extremity of a horizontal branch of an apple tree, and was visible one hundred yards off, though shaded by the sun, and was the work of a very beautiful bird." The following lines describe this peculiarity:—

"The oriole builds her a pensile nest;
It hangs by a thread, and it waves in the skies,
Yet no foe dares that tranquil asylum molest;
If he tempt the frail twig, it forsakes him—he dies.

"The lion is tracked to the wild tangled lair;
In vain the whale shrinks to the dark icy wave;
The elephant's strength may not burst the fell snare,
Nor the swift-bounding fawn find retreat in her cave.

"Yet the oriole sings in her soft fragile nest,
Though it hangs by a thread, and is rocked by the gale;
Foes are near, yet no tumult approaches her breast,
Her offspring no prowling marauders assail."

In studying the habits of certain kinds of birds, there is none which more frequently comes under observation than the common sparrow. "We have no bird," says the *Journal of a Naturalist*, "more generally known, thought of, or mentioned with greater indifference, perhaps contempt, than the common sparrow, 'that sitteth alone on the house-top;' yet it is an animal that Nature seems to have endowed with peculiar characteristics, having ordained for it a very marked provision, manifested in its increase and maintenance, notwithstanding the hostile attacks to which it is exposed. A dispensation that exists throughout creation is brought more immediately to our notice by the domestic habits of this bird. The natural tendency that the sparrow has to increase will often enable one pair of birds to bring up fourteen or more young ones in the season. They build in places of perfect security from the plunder of larger birds and vermin. Their art and ingenuity, in commonly attaching their nests beneath that of the rook, high in the elm—a bird whose habits are perfectly dissimilar, and with which they have no association whatever, making use of their structure only for a defence to which no other bird resorts—manifest their anxiety and contrivance for the safety of their broods. With peculiar perseverance and boldness they forage and provide for themselves and their offspring; will filch grain from the trough of the pig, or contend for its food with the gigantic turkey; and if scared away, their fears are those of a moment, as they quickly return to their plunder; and they roost protected from all the injuries of weather. These circumstances tend greatly to increase the race; and, in some seasons, their numbers in our corn-fields, towards autumn, are prodigious; and did not events counteract the increase of this army of plunderers, the larger portion of our bread-corn would be consumed by them. But their reduction is as rapidly accomplished as their increase; their love of association bringing upon them a destruction which a contrary habit would not tempt. They roost in troops, in our ricks, in the ivy, on the wall, &c., and are captured by the net; they cluster on the bush, or crowd on the chaff by the barn-door, and are shot by dozens at a time; or will rush in numbers, one following another, into the trap. These, and various other engines of destruction, so reduce them in the winter season, that the swarms of autumn gradually diminish, till their numbers in spring are in no way remarkable. I have called them plunderers, and they are so; they are benefactors, likewise, seeming to be appointed by Nature as one of the agents for keeping from undue increase another race of creatures; and by their prolificacy they accomplish it. In spring, and the early part of the summer, before the corn becomes ripe, they are insectivorous; and their constantly increasing families require an unceasing supply of food. We see them every minute of the day in continual progress, flying from the nest for a supply, and returning on rapid wing with a grub, a caterpillar, or some reptile; and the numbers captured by them in the course of these travels are incredibly numerous, keeping under the increase of these races, and making ample restitution for their plunderings and thefts. When the insect race becomes scarce, the corn and seeds of various kinds are ready; their appetite changes, and they feed on these with undiminished enjoyment. We have scarcely another bird, the appetite of which is so accommodating, in all respects, as that of the house sparrow. It is, I believe, the only bird that is a voluntary inhabitant with man; lives in his society, and is his constant attendant; following him wherever he fixes his residence. It becomes immediately an inhabitant of the new farm-house, in a lonely place or recent enclosure, or even in an island; will accompany him into the crowded city, and build and feed there in content, unmindful of the noise, the smoke of the furnace, or the steam-engine; where even the swallow and the martin, that flock around him in the country, are scared by the tumult, and leave him: but the sparrow, though begrimed with soot, does not forsake him; feeds on his food—rice, potatoes, or almost any other extraneous substance he may find in the street; looks to him for his support, and is maintained almost entirely by the industry and providence of man. It is not known in a solitary and independent state."

There is, apparently, a mixture of good and evil, of use and abuse, in every living thing; an whatever may be the injuries committed by sparrows, linnets, and other small birds, Nature has s arranged and balanced the materials of the universe, that there is a compensating or counterbalancing good for whatever evil may be sustained. It is true that the bullfinch feeds on the buds and seeds of trees; and it is equally true that the chaffinch does the same, especially in the early part of spring, when it inflicts great injury on the sprouting crops of various plants. The sparrow, as we have just seen, is very destructive of grain. It nestles in our stacks, and consumes large quantities; not, however, so large as another bird does, the snow-bunting. This bird, when the winters are severe, pours in upon us in prodigious numbers from the north, and, where they settle themselves, become the most determined of all the feathered depredators; not so much, however, by what they consume, as by what they destroy; the *modus operandi* of which is this:—In their search after grain they pay a visit to the stack, where, seizing the end of a straw, they forcibly draw it out. This they have been known to accomplish to such an extent, that the base of the rick has been found entirely surrounded by the straw, with one of its ends resting on the ground, whilst the other was supported by the stack as it slid down from the top, and the whole as regularly placed as if done by the careful hand of man; whilst the thatching was so completely pulled off, that it was absolutely necessary to remove the corn. In Stanley's *Familiar History of Birds*, we find the following curious calculation:—

"That some guess may be formed," he says, "of the possible extent of good or evil occasioned by small birds, we annex the result of our own observations on the precise quantity of food consumed by certain birds, either for their own support or that of their young; remarking, at the same time, that the difference observed in the instances, may be partly accounted for by the different quality of food required by young birds at different periods of their growth. Sparrows feed their young thirty-six times in an hour; which, calculating at the rate of fourteen hours a day, in the long days of spring and summer, gives 3,500 times per week—a number corroborated on the authority of another writer, who calculated the number of caterpillars destroyed in a week to be about 3,400. Redstarts were observed to feed their young with little green grubs from gooseberry trees, twenty-three times in an hour; which, at the same calculation, amounts to 2,254 times in a week: but more grubs than one were usually imported each time. Chaffinches at the rate of about thirty-five times in an hour, for five or six hours together, when they would pause, and not return for intervals of eight or ten minutes: the food was green caterpillars. The titmouse sixteen times an hour. The comparative weight consumed was as follows:—A greenfinch, provided with eighty grains, by weight, of wheat, in twenty-four hours consumed seventy; but of a thick paste, made of flour, egg, &c., it consumed upwards of 100 grains. A goldfinch consumed about ninety grains of canary-seed in twenty-four hours. Sixteen canaries consumed at the average rate of 100 grains each in twenty-four hours. The consumption of food by these birds, compared with the weight of their bodies, was almost one-sixth; which, supposing a man to consume food in the same proportion to his weight, would amount to about twenty-five pounds for every twenty-four hours."

There is one circumstance among birds, hawks, and fishes, which must strike with surprise the most unobservant admirer of animal life; and that is, the vast difference which exists between these various species in point of physical dimensions. There is the tiny field-mouse, and the gigantic elephant; the humming-bird, scarcely bigger than a bee, and the enormous condor; the silvery sprat, and the sable whale. There are no such differences among mankind. In point of physical dimensions, a dwarf is much nearer to the size of the largest giant than a humming-bird is to an eagle. In the East there is one species (*Trachilus Minimus*) of the beautiful aërial humming-bird, so small, that it is used, when dead, as an ornamental drop in the ears of ladies. It feeds upon the nectar of flowers, and its plumage is of the loveliest description. It has a missile tongue, and is so delicate, that when captured it instantly expires. Humboldt, in his illustrations to his admirable work on the *Views of Nature*, informs us, that the region which may be considered as the common resort of the condor, begins at an elevation as high as that of Mount Etna. It embraces atmospheric strata which are from 10,000 to 19,000 feet above the level of the sea. Humming-birds also, which, in their summer flights, advance as far as 61° north latitude, on the northern coast of America (and are, on the other hand, found in the Archipelago of the Tierra del Fuego), were seen by Von Tschudi, in Puna, at an elevation of 14,600 feet. "There is a pleasure," he says, "in comparing the largest and the smallest of the feathered inhabitants of the air. The largest among the condors found in the Cordilleras, near Quito, measure nearly fifteen feet across the expanded wings, and the smaller ones eight and a-half. This size, and the visual angle at which the birds are seen vertically above one's head, affords an idea of the enormous height to which the condor soars in the clear sky. A visual angle of four minutes, for instance, would give a vertical elevation of 7,330 feet. The cavern of Antisana, opposite the mountain of Chussulongo, where we measured the birds soaring over the chain of the Andes, is at an elevation of nearly 16,000 feet above the surface of the Pacific: the absolute height which the condor reached must, therefore, be 23,273 feet—a height at which the barometer scarcely stands at 12·7 inches; but which, however, does not exceed that of the loftiest summit of the Himalaya. It is a remarkable physiological phenomenon, that the same bird which wheels for hours together through these highly rarefied regions, should be able suddenly—as, for instance, in the western declivity of the volcano of Pinchincha—to descend to the sea-shore, and thus, in the course of a few hours, traverse, as it were, all climates. At heights of 23,000 feet, and upwards, the membranous air-sacs of the condor must undergo a remarkable degree of inflation after being filled in lower regions of the atmosphere."

More than a hundred years ago, Ulloa expressed astonishment that the vulture of the Andes could attain heights where the atmosphere was less than fifteen inches. It was an opinion entertained in his time, that no animal could exist under so slight an amount of atmospheric pressure. "I have myself," says Humboldt, "seen the barometer fall to 14·85 inches in the Chimborazo; and my friend, M. Gay Lussac, breathed, for a quarter of an hour, an atmosphere in which the pressure was only 12·9 inches. It must be admitted that man finds himself in a state of painful exhaustion at such elevations; but in the condor, the respiratory process seems to be performed with equal facility under a pressure of thirty or of thirteen inches. This bird probably raises itself, *voluntarily*, to a greater height from the surface of our earth than any other living creature. I use the expression 'voluntarily,' since small insects and siliceous-shelled infusaria are frequently borne to greater elevations by a rising current of air. It is probable that the condor flies even higher than the above calculations would appear to show."

Humboldt tells us, that near Cotopaxi, in the pumice plain of Suniguaicu, he saw, at an elevation of 14,471 feet above the level of the sea, a condor soaring at such a height above his head, that it appeared like a black speck. "But what," he asks, "is the smallest angle under which faintly illumined objects can be distinguished? Their form (linear extension) exercises a great influence on the minimum of this angle. The transparency of the mountain air is so great under the equator, that in the province of Quito, the white cloak (*poncho*) of a horseman may be distinguished with the naked eye at a horizontal distance of 89,664 feet; and, therefore, under an angle of thirteen seconds. It was my friend Bonpland, whom we observed from the pleasant country-seat of the Marquis de Selvalegre, moving along a black rocky precipice on the volcano of Pinchincha. Lightning conductors, being thin elongated objects, are visible, as Arago has observed, from the greatest distances, and under the smallest angles."

Returning to the condor, it would appear that this bird is not found beyond the equator in New Granada, yet proceeds as far south as the Straits of Magellan. In Chili, as in the plateaux of Quito, condors usually live in pairs, but sometimes alone, although they gather in flocks when designing to attack calves or lambs, or to seize on young guanacos (guanacillos). The destruction perpetrated yearly by them among the herds of goat, sheep, and cattle, as well as among the wild alpacas, vicuñas, and guanacos of the Andes, is very great. It is asserted by the Chilians, that when in a state of captivity this bird can live forty days without food; but, in its natural state, its voracity is something extraordinary. Indeed, it is so great, that after feeding on a dead ox, it so gorges itself that it has to move some distance before it is able to raise itself from the ground. After the declaration of their political independence, the Chilians adopted a representation of the condor as a symbol of strength for their coinage.

Whatever may be the destructive as well as disgusting propensities of the condor, and other species of gallinagos, they are not without their beneficial purposes in the great scheme of nature. The design of their being seems principally to be, to destroy and remove decomposing animal matter, and thus purify the atmosphere in the vicinity of human habitations. "In tropical America," says Humboldt, "I have sometimes seen seventy or eighty of these creatures collected round a dead ox; and I am able, as an eye-witness, to confirm the fact that has of late erroneously been called in question by ornithologists, that the appearance of one single king-vulture, which is not larger than the gallinagos, is sufficient to put a whole assemblage of these birds to flight. No contest ever takes place; but the gallinagos are intimidated by the sudden appearance and the courageous demeanour of the richly-coloured *Sarcoramphus Papa.* As the ancient Egyptians protected the Perenopteri, which purified the atmosphere, so, also, the wanton destruction of gallinagos is punished in Peru by a fine, which, according to Gay, amounts in some cities to 300 piastres for every bird. It is a remarkable fact, that this species of vulture, if trained early, will so accustom themselves to the person who has reared them, that they will follow him on a journey for many miles, flying after his carriage across the Pampa."

Here, whilst speaking of the extraordinary altitude to which the condor can fly, it may not be out of the way to observe, that the operation of a bird flying is similar to that of a fish swimming. Both bodies are admirably adapted to their separate elements; and as they are both shaped like a wedge, they meet with the smallest possible resistance to their motions. The fish is buoyed up in the water by a bladder, which contains a peculiar kind of air, and which can, in general, be inflated or exhausted at the will of the animal. If the experiment of puncturing the air-bladder with a pin is made, the air immediately escapes, and the fish sinks to the bottom. It has no longer the power to sustain itself in a floating position. The fins of the fish are nothing less than natural oars given to enable it to propel itself through its element, and the tail is its rudder. Similarly, the bird is furnished with air-cells, largely distributed through its body. Its bones are entirely destitute of marrow, being quite hollow, that they may be filled with air to assist it in its passages through the atmosphere. Before taking its flight, the bird inflates its cells by one or two deep inspirations, then spreading its wings and the feathers of its tail, springs into the air. This it rapidly beats, with all its force, with its wings, and thus skims forward or upward, not in an exactly straight, but in an oblique direction. Thus does it continue alternately opening and closing its wings, and striking the air with all its force to sustain and propel it in its flight. Like the fins of the fish, these are just aërial oars, and the legs or the tail act as a rudder. The bird is supported in the air by air itself, as a consequence of certain mechanical actions performed by the animal, in union with the general lightness and buoyancy of the body, and the resistance which the atmosphere makes to the rapid strokes of its wings. When a bird is floating or hovering, its wings are widely expanded, when large hollow or concave surfaces are presented to the air, which then gives a sufficient resistance to prevent the animal from falling to the ground. When a bird is flying, its head, neck and legs are brought into action, either to preserve or to shift the position of the centre of gravity; and the facility with which this is done is always interesting, and sometimes amusing. The Reverend Gilbert White, in one of his delightful Selbourne letters, says—

"Owls move in a buoyant manner, as if lighter than the air; they seem to want ballast. There is a peculiarity belonging to ravens that must draw the attention even of the most incurious: they spend all their leisure time in striking and cuffing each other on the wing, in a kind of playful skirmish; and when they move from one place to another, frequently turn on their backs with a loud croak, and seem to be falling to the ground. When this odd gesture betides them, they are scratching themselves with one foot, and thus lose the centre of gravity."

Next to the condor in size is the lammergier, of Switzerland, and the *Falco Destructor;* these being the largest of all flying birds. In Scotland, the largest bird is the eagle, which is a true Waltonian, being very destructive to the salmon of that country. In the spawning season, it is often discovered watching the fords, ready to dart upon and carry off the silvery fish to its wind-rocked eyry on the lofty cliff of some neighbouring mountain. Some years ago, a herdsman, in a sultry day of July, while searching in the glens and ravines for a missing sheep of his flock, observed an eagle standing patiently on a bank that overlooked a pool in one of the numerous fish-supplied streams of Scotland. In a short time the bird stooped and seized a salmon, when a violent struggle ensued between the fish, half out of the water, and the eagle half in it The herdsman hastened to the scene of action, when, to his surprise, he saw the eagle pulled completely under the water by the great power of the salmon; and the Julian stillness of the day, combined with the drenching which his plumage had sustained, rendered the lord of the sky unable to extricate himself. With a stone the herdsman broke his pinion, and succeeded in securing both the spoiler and his victim, for the salmon was found expiring in the vice-like grasp of his talons.

A gentleman informs us, that while shooting in Lord Sligo's mountains near the Killeries, he heard many particulars of the habits and history of the eagle, from a grey-haired peasant who had passed a long life in these wildernesses. The scarcity of hares, which here were once over-abundant, he attributed to the rapacity of that bird; and he affirmed, that when in pursuit of these animals, the eagles discovered a degree of intelligence that appeared almost incredible. They coursed the hares, he said, with great judgment and invariable success—one bird being the active pursuer, while the other kept in reserve at a distance of from forty to fifty yards. If the hare, by a sudden turn, freed himself from his most pressing enemy, the second bird instantly took up the chase, and thus prevented their victim from having the slightest respite. He had, also, remarked the eagles whilst engaged in fishing. They chose a small ford upon the rivulet which connects Glencullen with Glandullah, and, posted on each side, they waited patiently for the salmon to pass over. Their watch was never fruitless; and many a salmon, in its transit from the sea to the lake, was transferred from its native element to the wild eyry in the Alpine cliff that beetles over the romantic waters of Glencullen.

> "The hunting tribes of air and earth
> Respect the brethren of their birth;
> Nature, who loves the claim of kind,
> Less cruel chase to each assigned.
> The falcon, poised on soaring wing,
> Watches the wild duck by the spring;
> The slow-hound makes the fox's lair,
> The greyhound presses on the hare;
> The eagle pounces on the lamb,
> The wolf devours the fleecy dam;
> E'en tiger fell, and sullen bear,
> Their likeness and their lineage spare;
> Man only mars kind nature's plan,
> And turns the fierce pursuit on man."
> SCOTT.

There is a peculiarity in the vocal organs of birds, as well as, in some, of the instinct to migrate, which may here be noticed. In man, and most of the warm-blooded animals, the larynx or vocal-box forms a protuberance in the front of the throat; but in birds, the same organ is placed at the bottom of the neck, instead of at the top. With regard to the habit of migrating from one country to another, we find it strong in the swift, which, to avoid heat, conceals itself in the middle of the day, and only makes its appearance in mornings and evenings. Its early migration from England may, probably, be caused by the heat; as Buffon says, instead of warmer, it seeks colder climates. In reference to the house-swallow, it usually remains in England till October, and is stated to pass the winter in Africa. If this is the case, its object in migrating is heat in place of cold. "It is remarkable," says the Reverend William Kirby, in his work *On the Power, Wisdom, and Goodness of God*, "that the birds of this tribe (swallows), when they visit us in the spring, return to their old haunts. Dr. Jenner ascertained this by cutting off two claws from the foot of a certain number, several of which were found in the following year; and one was met with after the expiration of seven. The instinct that directs these little beings so unerringly across continents and oceans, and leads them to their native clime, is wonderful, and inexplicable under any other principle than that of Divine superintendence." Viellot says that all the swallows do not leave the warm countries to which they resort for the sake of their being more congenial to their temperaments; but that one portion of them migrates, while another remains, throughout the year, in Egypt, Ethiopia, and other tropical countries and islands.

"But besides the birds that visit England during the more genial part of the year, and add so greatly to the beauty and music of our groves in spring and summer, there are others, and those a numerous tribe, that wing hither their way when the reign of winter has commenced. The most plentiful of these are the birds which the Author of Nature has fitted to disport themselves and seek their food in the water, or which frequent humid or watery places. When the Arctic seas, and lakes and rivers, present an unbroken field of impenetrable ice, the various web-footed birds, the swans, and geese and ducks, and divers and coots, and an infinity of others, forming their angular, and sometimes triangular phalanxes, each in turn taking the lead, and first cutting the air, fly off, often at a great height, to seek in more southern climates, not a region devoid of the usual concomitants of winter, frost and snow, but when their rigours are mitigated, so as to afford to these creatures the means of life. Now, also, the waders, usually distinguished by their long legs and long beaks, as the woodcock, the curlew, and the snipes, leave their native marshes and haunts to seek others whose frozen, or partially frozen, morasses afford them a supply of the worms and vermicles, or similar animals that form their usual nutriment. . . . Thus we see the change of seasons brings with it a change in the winged inhabitants of every country; and the winter immigration of a vast variety of birds, fit for food and other useful purposes, makes up, in some degree, for the summer or autumnal emigration of those which, being constantly before our eyes, moving in every direction, and rendering vocal every grove or tree, and even the very heavens, entertain our senses of seeing and hearing in a most delightful manner. Thus, also, all countries partake, in some degree, by this shifting scene of animal life, of the same blessings and pleasures derived from the same instruments."

The instinct of migrating in birds suggests a few words on the all-pervading principle of heat, without which the earth would be little more than a barren waste. It is to this principle that we are mostly, if not altogether, indebted for the comforts and pleasures we enjoy. Our very being depends upon its presence, whilst it stimulates the growth and motion of all the beauty and fertility with which, in the spring, the summer, and the autumn, we behold ourselves surrounded. It is the means by which our granaries and store-houses are filled with the fruits of the earth, making provision for us through the winter, when the soil is bound up in cold, and the waters are covered with ice and snow; when the vegetable world is overcome by a universal torpor; when the ground is bare, and the forest is leafless; when the atmosphere is keen to biting, and the skies loaded with gloom. It may be called the Benefactor of Providence, as it is everywhere present. It is not only within us, but everywhere around us, producing the infinite varieties which are found in the animal, the vegetable, and the mineral kingdoms. It is by it, artificially produced, that we are enabled to manufacture the tools and implements of art, science, and domestic life. It is by its means that we cook our food, thereby, in many instances, imparting to it not only a fine flavour, but additional nourishment; and it is by it that we are warmed in winter, and vivified in summer. Yet its cause is still a mystery. We are fully aware of its effects, which have been collected and generalised with great industry, skill, and judgment. Indeed, so completely or perfectly has this been done, that the facts ascertained may be said to form a complete science, the study of which is not only highly interesting and useful, but indispensable to all who would devote themselves to an investigation of the beautiful phenomena of the material world.

Nocturnal life is another feature of animated nature, which must not here be left unnoticed; and Humboldt, in his *Views of Nature*, furnishes us with a description of it in South America, so vivid and interesting, that we cannot resist the temptation we feel to quote at large from his volume. This, however, would be taking too great a liberty, so we will content ourselves with the following passages. He is sailing in a narrow canoe, on the bosom of the Orinoco. "On leaving the Island del Diamante, where the Zambos, who speak Spanish, cultivate the sugar-cane, we entered into a grand and wild domain of nature. The air was filled with countless flamingoes, and other water-fowl, which seemed to stand forth from the blue sky like a dark cloud, in ever-varying outlines. The bed of the river had here contracted to less than 1,000 feet, and formed a perfectly straight canal, which was inclosed on both sides by thick woods. The margin of the forest presents a singular spectacle. In front of the almost impenetrable wall of colossal trunks of *Cæsalpinia*, *Cedrela*, and *Desmanthus*, there rises, with the greatest regularity, on the sandy bank of the river, a low hedge of sanso, only four feet high: it consists of a small shrub, *Hermesia Castanifolia*, which forms a new genus of the family of *Euphorbiaceæ*. A few slender, thorny palms, called by the Spaniards Piritu and Corizo, stand close alongside; the whole resembling a trimmed garden-hedge, with gate-like openings at considerable distances from each other, formed, undoubtedly, by the large four-footed animals of the forests, for convenient access to the river. At sunset, and more particularly at break of day, the American tiger, the tapir, and the peccary may be seen coming forth from these openings, accompanied by their young, to give them drink. When they are disturbed by a passing Indian canoe, and are about to retreat into the forest, they do not attempt to rush violently through these hedges of sanso, but proceed deliberately along the bank, between the hedge and the river, affording the traveller the gratification of watching their motions for, sometimes, four or five hundred paces, until they disappear through the nearest opening. During a seventy-four days' almost uninterrupted river navigation of 1,520 miles up the Orinoco, to the neighbourhood of its sources, and along the Cassiquiare and the Rio Negro—during the whole of which time we were confined to a narrow canoe—the same spectacle presented itself to our view at many different points, and, I may add, always with renewed excitement. There came to drink, bathe, or fish, groups of creatures belonging to the most opposite species of animals; the larger mammalia, with many-coloured herons, palamedeas, and the proudly strutting curassow. 'It is here as in paradise,' remarked, with pious air, our steersman, an old Indian, who had been brought up in the house of an ecclesiastic. But the gentle peace of the primitive golden age does not reign in the paradise of these American animals; they stand apart, watch, and avoid each other. The capybara, a cavy (or river-hog) three or four feet long (a colossal repetition of the common Brazilian cavy), is devoured in the river by the crocodile, and on the shore by the tiger. It runs so badly, that we were frequently able to overtake and capture several from among the numerous herds.

"Below the mission of Santa Barbara de Arichuna we passed the night, as usual, in the open air, on a sandy flat, on the bank of the Apure, skirted by the impenetrable forest. We had some difficulty in finding dry wood to kindle the fires, with which it is here customary to surround the bivouac, as a safeguard against the attacks of the jaguar. The air was bland and soft, and the moon shone brightly. Several crocodiles* approached the bank; and I have observed that fire attracts these creatures, as it does our crabs, and many other aquatic animals. The oars of our boats were fixed upright in the ground, to support our hammocks. Deep stillness prevailed, only broken, at intervals, by the blowing of the fresh-water dolphins,† which are peculiar to the river net-work of the Orinoco; as, according to Colebrooke, they are also to the Ganges, as high up the river as Benares: they followed each other in long tracks.

"After eleven o'clock, such a noise began in the contiguous forest, that, for the remainder of the night, all sleep was impossible. The wild cries of animals rung through the woods. Among the many voices which resounded together, the Indians could only recognise those which, after short pauses, were heard singly. There was the monotonous, plaintive cry of the aluates (howling monkeys); the whining, flute-like notes of the small sapajous; the grunting murmur of the striped, nocturnal ape, which I was the first to describe; the fitful roar of the great tiger; the cuguar, or maneless American lion; the peccary; the sloth; and a host of parrots, parraquas, and other pheasant-like birds. Whenever the tigers approached the edge of the forest, our dog, which before had barked incessantly, came howling to seek protection under the hammocks. Sometimes the cry of the tiger resounded from the branches of a tree, and was then always accompanied by the plaintive, piping tones of the apes, endeavouring to escape from the pursuit.

"If one asks the Indians why such a continuous noise is heard on certain nights, they answer, with a smile, that 'the animals are rejoicing in the beautiful moonlight, and celebrating the return of the full moon.' To me, the scene appeared rather to be owing to an accidental, long-continued, and gradually increasing conflict among the animals. Thus, for instance, the jaguar will pursue the peccaries and the tapirs, which, densely crowded together, burst through the barrier of the tree-like shrubs which oppose their flight. Terrified at the confusion, the monkeys on the tops of the trees join their cries with those of the larger animals. This arouses the tribes of birds which build their nests in communities, and suddenly the whole animal world is in a state of commotion. Further experience taught us, that it was by no means always the festival of moonlight that disturbed the stillness of the forest; for we observed that the voices were loudest during violent storms of rain, or when the thunder echoed, or the lightning flashed through the depth of the woods. The good-natured Franciscan monk, who (notwithstanding the fever from which he had been suffering for many months) accompanied us through the cataracts of Atures and Maypures to San Carlos, on the Rio Negro, and to the Brazilian coast, used to say, when apprehensive of a storm at night, 'May Heaven grant a quiet night both to us and to the wild beasts of the forest!'

"A singular contrast to the scenes I have here described, and which I had repeated opportunities of witnessing, is presented by the stillness which reigns within the tropics at the noontide of a day unusually sultry. At the narrows of Barrguan the Orinoco forms for itself a passage through the western part of the mountains of the Parime. That which is called, at this remarkable pass, a Narrow, is, however, a basin nearly 5,700 feet in breadth. With the exception of an old withered stem of Aubletia, and a new Apocinea, the barren rocks were only covered with a few silvery croton shrubs. A thermometer observed in the shade, but brought within a few inches of the lofty mass of granite rock, rose to more than 122° Fahrenheit. All distant objects had wavy, undulating outlines, the optical effect of the *mirage*. Not a breath of air moved the dust-like sand. The sun stood in the zenith; and the effulgence of light poured upon the river, and which, owing to a gentle ripple of the waters, was brilliantly reflected, gave additional distinctness to the red haze which veiled the distance. All the rocky mounds and naked boulders were covered with large thick-scaled iguanas, gecko-lizards, and spotted salamanders. Motionless, with uplifted heads and widely-extended mouths, they seemed to inhale the heated air with ecstasy. The larger animals, at such times, take refuge in the deep recesses of the forest; the birds nestle beneath the foliage of the trees, or in the clefts of the rocks: but if, in this apparent stillness of nature, we listen closely for the faintest tones, we detect a dull, muffled sound, a buzzing and humming of insects close to the earth, in the lower strata of the atmosphere. Everything proclaims a world of active organic forces. In every shrub, in the cracked bark of trees, in the perforated ground inhabited by hymenopterous insects, life is everywhere audibly manifest. It is one of the many voices of nature revealed to the pious and susceptible spirit of man." Thus in all places there is life. There are, probably, 500 species of quadrupeds on the globe, and every species contains many millions of individuals; it certainly is so with some. For example, of birds it is thought there are 4,000 species; of fishes, 2,500; of reptiles, 700; and more than 44,000 different kinds of insects, besides thousands upon thousands of species altogether invisible to the eye.

---

* The *true crocodile* is found in the river Nile, but by no means in such plenty as in the times of the Pharaohs. The species which is domesticated by the priests, and magnificently provided for in a temple at Memphis, was of a green colour. It was an object of profound worship, called a god, and embalmed when it died. On the other hand, the *alligator* is exclusively found in America; and instead of having an uninterrupted series of teeth round both jaws, as in the crocodile, the fourth tooth of the under jaw shuts into a corresponding socket in the upper one. This law is so universal, that any person, by remembering this fact, may with certainty distinguish the one from the other.

† These are not sea-dolphins, which, like some species of *Pleuronectes* (flat fish, which invariably have both eyes on one side of the body), ascend the rivers to a great distance—as, for instance, the limande, which is found as far inland as Orleans. Some forms of sea-fish, as the dolphin and skate, are met with in the great rivers of both continents. The fresh-water dolphin of the Apure and the Orinoco differs specifically from the *Delphinus Gangeticus*, as well as from all sea-dolphins.—*Note to Humboldt's Views of Nature.*

In passing from birds to botany, it gives us pleasure to reflect on the extent of the means, and the multiplicity of the sources, from which the student of nature can gather his enjoyments. In considering the infinite number of plants, united by the most intimate affinities, yet every one distinct from its congener, it is impossible not to be solemnly impressed with the magnificence of the design of the Supreme Being in giving both variety and union to His works, of which, in the arrangements of plants, we get a glimpse; although, in the detail, these form but an inconsiderable portion of His benign care. In the aggregate, Nature exhibits an unbroken chain, so admirably linked together as to form a perfect piece of unity. The links of this chain, so to speak, are examined separately, and comparisons made between them, so as to discover what differences may exist among them. When, however, we reflect upon the fact, that all creation is comprehended under one regularly graduated whole; that it shows us, in regular gradations, a progressive development, from the lowest condition of inorganic matter up to man, the most perfect of animated beings; how impossible does it seem to us to trace these gradations, and almost invisible distinctions, which lead from one living creature to another, as we rise in the scale of creation! The faculties of man are inadequate to the task of comprehending all the laws of nature; but the outline of her works being more obvious, falls within the reach of his capacity. The index to her operations may easily be perused, although the details frequently appear in strange and incomprehensible characters. The whole may be seen, as observed by Maund, composed of an alphabet of simple elements—elements which combine into matter as letters into words; matter combines into beings as words into sentences; and again, as series of sentences make chapters, so series of beings constitute classes; and of these the incomprehensible book of creation is completed and perfected by the hand of the original Lawgiver. We see an infinite variety everywhere. We sometimes look into the effect, and discover the agent by which this was produced, when the human mind is, too frequently, satisfied. True philosophy would pursue the subject still further; and thus we should not stop short of the admiration of Divine power, and humiliation of our own wisdom, which is becoming our present state of dependence—a dependence, notwithstanding, under which all may so freely enjoy the boundless riches and beauty everywhere presented to their contemplation.

Of the many beautiful objects that adorn the earth, there is not one of them possessed of more beauty and gracefulness than a tree. An oak, with its tortuous and gnarled branches; an elm, with its lofty mass of cloud-like foliage, are both objects of extreme beauty when clothed in the luxuriance of a rich and sunny summer. Even in winter the forest teems with beauty. Although there is then scarcely a weed to be seen upon the exposed patches of ground, still may be observed many a sweet and lowly green wildling, lifting its modest head under their friendly shelter. At such periods the diminutive white flower of the common chickweed, and the lively green of the dog's mercury, are invested with charms which might not unlikely be passed unheeded by, amidst the profuse luxuriance of summer; but which are then extremely refreshing to the sight. The handsome clusters of crowned seeds twined by some stray clematis over, perhaps, a wild rose-bush, whose boughs, though denuded of leaves, are hanging with vermilion hips; the ivy arranged in its dark-green suit, covered with smooth berries, for buttons, clinging round the unbending branch of the old oak, and the mistletoe of Druidical memory, embracing the wild plum-tree, are all objects capable of giving delight to the naturalist, or the lover of nature. The privet too, preserving its covering through the winter, is adorned with its shining black fruit, over which the crimson berries of the nightshade still depend, and tempt only to betray. Then there is "the lady of the woods," as Coleridge calls the birch-tree, the boughs of which are pointed with the most delicate catkins, and bend so gracefully that one would think they had been fashioned in an hour when nature was kind and prodigal of beautiful forms. Then there is the hazel-tree, the butcher's-broom, and the prickly holly-bush, with its smooth leaves of glancing green, from anong which appear clusters of coral berries, like red-coated riflemen amidst the thick shrubbery of a primeval forest. The oak, too, may still have some leaves lingering upon it, tinted with the gamboge of autumn, or the sienna, which indicates a further state of decay; its massive stem covered with emerald moss, and its wide-spreading branches, heedless alike of the cold, the snow, and the tempest, stretching themselves protectingly over the lowly plant-life that may be still in existence beneath them. From year to year, this pride of the English forest may be the object of examination from our boyhood to our old age, and we shall be able to discern no impression made upon it by the hand of time. Its leaves may look a little darker, and its trunk a little more blackened; but that is all. It is as strong, and as free from being affected by the elements of decay in our age, as it was in our childhood.

Whatever may be the grandeur which we see in the forests of the north, or the temperate zone, it cannot compare with that which meets us in the region of the tropics. Tropical America is the sphere of gigantic vegetation. It is there that Nature clothes the earth with a luxuriance of verdure, a richness of vegetation, and an exuberance of arboreous giants to which colder latitudes can present no parallel. "In the cold north," says Humboldt in a fine spirit of admiration, "the bark of trees is covered only with dry lichens and mosses; while, beneath the tropics, the cymbidium, and the fragrant vanilla, adorn the trunks of the anacardias and the gigantic fig-tree. The fresh green of the pothos leaves, and of the dracontias, contrast with the many-coloured blossoms of the *Orchidæ;* climbing bauhinias, passion-flowers, and golden-flowered banisterias encircle every tree of the forest. Delicate blossoms unfold themselves from the roots of the *Theobroma,* and from the thick and rough bark of the *Crescentia* and *Gustavia.* Amid this luxuriant abundance of flowers and foliage—amid this exuberant and tangled web of creeping plants, it is often difficult for the naturalist to recognise the stems to which the various leaves and blossoms belong. A single tree adorned with *Paullinias, Bignonias,* and *Dendrobias,* forms a group of plants which, separated from each other, would cover a considerable space of ground. In the tropics plants are more succulent, of a paler green, and have larger and more glossy leaves than in the northern regions. Social plants, which give such a character of uniformity to European vegetation, are almost wholly absent in the equatorial zone. Trees, almost twice as high as our oaks, there bloom with flowers as large and splendid as our lilies. On the shady banks of the Magdalena river, in South America, grows a climbing Aristolochia, whose blossoms, measuring four feet in circumference, the Indian children sportively draw on their heads as caps. In the South Indian Archipelago, the flower of the Rafflesia is nearly three feet in diameter, and weighs above fourteen pounds.

"The extraordinary height to which not only individual mountains, but even whole districts, rise in tropical regions, and the consequent cold of such elevations, affords the inhabitant of the tropics a singular spectacle. For besides his own palms and bananas, he is surrounded by those vegetable forms which would seem to belong solely to northern latitudes. Cypresses, pines, and oaks; barberry shrubs and alders (nearly allied to our own species), cover the mountain plains of Southern Mexico, and the chain of the Andes at the equator. Thus nature has permitted the native of the torrid zone to behold all the vegetable forms of the earth without quitting his own clime, even as are revealed to him the luminous worlds which spangle the firmament from pole to pole. These, and many other of the enjoyments which nature affords, are denied to the nations of the north. Many constellations, and many vegetable forms, including more especially the most beautiful productions of the earth (palms, tree-ferns, bananas, arborescent grasses, and delicately feathered mimosas), remain for ever unknown to them; for the puny plants pent up in our hot-houses, give but a faint idea of the majestic vegetation of the tropics. But the rich development of our language, the glowing fancy of the poet, and the imitative art of the painter, afford us abundant compensation, and enable the imagination to depict, in vivid colours, the images of an exotic nature. In the frigid north, amid barren heaths, the solitary student may appropriate all that has been discovered in the most remote regions of the earth, and thus create within himself a world as free and imperishable as the spirit from which it emanates."

Of the amazing proficiency and variety of nature in the vegetable kingdom, we are informed in a scientific illustration to the chapter in the *Views of Nature,* from which we have made the above quotation. There are three questions which suggest themselves, and which are to be carefully distinguished from each other. 1. How many species of plants have been described in printed works? 2. How many of those discovered—that is to say, included in herbariums—still remain undescribed? 3. How many species probably exist on the surface of the earth? Murray's edition of the Linnæan system contains, including cryptogamic plants, only 10,042 species. Willdenow, in his edition of the *Species Planterum,* from 1797 to 1807, has described as many as 17,457 species of phanerogamia, reckoning the *Monandria* to *Polygamia Diœcia.* If to these we add 3,000 species of cryptogamic plants, we shall bring the number, as given by Willdenow, to 20,000. More recent investigations have shown how far this estimate of the species described, and of those preserved in herbariums, falls short of the truth. Robert Brown first enumerated above 37,000 phanerogamia; and Humboldt, at that time, attempted to describe the distribution of 44,000 species of phanerogamic and cryptogamic plants over the different portions of the world already explored. "If we consider how many new species have been described by travellers since that time (my expedition alone afforded 3,600 of the 5,800 collected species of equinoctial plants), and if we bear in mind that there are assuredly upwards of 25,000 phanerogamic plants cultivated in all the different botanical gardens, we shall soon see how much Decandolle's estimate is below the truth. From our complete ignorance of the interior of South America (Mato-Grosso, Paraguay, the eastern declivity of the Andes, Santa Cruz de la Sierra, and all the countries lying between the Orinoco, the Rio Negro, the Amazon, and Puruz), of Africa, of Madagascar and Borneo, and of Central and Eastern Asia, the idea involuntarily presents itself to the mind, that we are not yet acquainted with one-third, or probably even with one-fifth, part of the plants existing on the earth. Drège has collected 7,092 phanerogamic species in South Africa alone; and he believes that the flora of that region consists of more than 11,000 phanerogamic species, seeing that, in Germany and Switzerland, on an equal area (192,000 square miles), Koch has described only 3,300, and Decandolle only 3,645 phanerogamia in France. I would here, also, instance the new genera, consisting partly of high forest trees, which are still being discovered in the neighbourhood of large commercial towns in the lesser Antilles, although they have been visited by Europeans for the last 300 years. Such considerations seem to verify the ancient myth of the Zend-Avesta, that 'the creating primeval force called forth 120,000 vegetable forms from the sacred blood of the bull.'"

In another comprehensive and valuable note on the same essay, we find it stated, that the forms of organic beings are dependent on each other. "Such is the unity of nature, that these forms limit each other in obedience to laws which are probably connected with long periods of time. When we have ascertained the numbers of the species, on any particular part of the earth's surface, belonging to one of the great families of the *Glumaceæ*, the *Leguminosæ*, or the *Compositæ*, we may, with some degree of probability, form approximative conclusions regarding the number of all the phanerogamia, as well as of the species belonging to the other families of plants, growing in the country. The number of the *Cyperoideæ* determines that of the *Compositæ*, and the number of the latter determines that of the *Leguminosæ*; and these estimates, moreover, enable us to ascertain in what classes and orders the floras of a country are still incomplete; teaching us what harvests may still be reaped in the respective families, if we guard against confounding together very different systems of vegetation.

"The comparison of the numerical proportions of families in the different zones which have, as yet, been well explored, has led us to a knowledge of the laws which determine the numerical increase or decrease of vegetable forms constituting a natural family, in proceeding from the equator to the poles, when compared, for instance, with the whole mass of phanerogamia peculiar to each zone. We must here have regard, not only to the direction, but also to the rapidity or measure of the increase. We see the denominator of the fraction, which expresses the ratio, increase or diminish. Thus, for instance, the beautiful family of the *Leguminosæ*, diminishes in proportion as it recedes from the equinoctial zone to the north pole. If we find its ratio for the torrid zone (from 0° to 10° of latitude) $\frac{1}{10}$th, we shall have for the part of the temperate zone (lying between 45° and 52°) $\frac{1}{18}$th, and for the frigid zone (between 67° and 70° lat.) only $\frac{1}{35}$th. The direction followed by the great family of the *Leguminosæ* (viz., increase towards the equator) is also that of the *Rubiaceæ*, the *Euphorbiaceæ*, and especially the *Malvaceæ*. On the other hand, the *Gramineæ* and the *Juncaceæ* (the latter more than the former), the *Ericeæ* and *Amentaceæ*, diminish towards the torrid zone. The *Compositæ*, *Labiatæ*, *Umbelliferæ*, and *Cruciferæ*, diminish from the temperate zone towards the pole and the equator, and the two latter families most rapidly in the direction of the equatorial region; whilst in the temperate zone, the *Cruciferæ* are three times more abundant in Europe than in the United States of North America. In Greenland, the *Labiatæ* are reduced to only one species, and the *Umbelliferæ* to two; while the whole number of the phanerogamia still amounts, according to Hornemann, to 315 species."

Respect for, and the study of, the works of creation have a tendency to make us both wiser and happier, and lead us to the contemplation of the Omniscient Dispenser of the objects we admire. If the internal structure of the perfect animal, and that of the perfect vegetable, are examined with care, and the manner in which both are fed and nourished minutely observed, it will be found that a remarkable resemblance exists between them in the organs of circulation, respiration, and digestion.

They both display the most striking property of organised beings, as distinguishing them from dead inorganised matter—that of internal nourishment and growth. They take into themselves dead and foreign substances, and within their own organs metamorphose them into different substances; throw off from themselves such as are not required for the support of their being, and expose the rest to the air, to breathe upon them, and then select from them one portion to supply the waste of the body, another for the growth, and thus form out of them all the varied substances which go to make the perfect animal as well as the perfect plant.

As the word *nature* has frequently been used in this essay, it may not be amiss, in this place, to show how it has been defined by philosophers and learned men. Maund remarks, "that we see a beautiful and infinite variety everywhere presented to us in the *works of nature;*" which implies that nature is an agent producing many objects, all working to some end. He further says, "that man seeks for primary causes of this exuberant effect; but if he forget the First Great Cause, on which all others depend, he is quickly surrounded by doubts and difficulties, and finds his reasoning degenerate into conjecture." This is only saying that there is some *power* different from *nature*, which was created by that power. Lamarck says that "the life which we see in certain bodies, in some sort resembles *nature*, insomuch that it is not a being, but an order of things animated by movement, which has, also, its power, its faculties, and which exercises them necessarily while it exists." This is a materialistic theory. In analysing this theory, the Reverend William Kirby remarks, in his treatise on the *Power, Wisdom, and Goodness of God*, "that although *nature*, as defined by Lamarck, consists merely of abstract qualities, independent of any essence or being, and, therefore, can neither form anything, nor operate upon what is already formed; yet would I, by no means, be understood as contending that there are no *inter-agents* between God and the visible material world, by which he acts upon it, and, as it were, takes hold of it; by which he has commenced, and still maintains, motion in it and its parts; causing it to observe certain general and local laws, and upholds, in the whole and every part, those several powers and operations that have been thus produced; that action and counter-action everywhere observable, by which all things are maintained in their places; observe their regular motions and revolutions; and exhibit all those phenomena that are produced under different circumstances. Whatever names philosophers have used to designate such powers, they have a real substance and being, and are a something that can act and operate, and impart a momentum." This theory, then, indicates the existence of a God, a Creator of the universe, who acts by *inter-agents*, which are *heat and cold*—Lord Verulam's *two hands* of Nature. Thus what we call *nature* is the visible material world, as represented by the earth, the ocean, the sky, and all things that live, move, and have their being, in connection with these magnificent objects. Pope says—

"All nature is but art unknown to thee,
All chance, direction which thou canst not see;
All discord, harmony not understood;
All partial evil, universal good."

It would appear, then, that a Supreme Power creates; and Nature, an inferior power, produces; and the abundance in which this is done fills the mind with wonder. Humboldt, in his investigations respecting the numerical laws of the distribution of vegetable forms, tells us that rich collections of the Natural History of Paris contained, in 1820, no fewer than above 56,000 species of phanerogamic and cryptogamic plants in the herbariums; 44,000 insects (considered below the actual number); 25,000 species of fishes; 700 reptiles; 500 mammalia; and 4,000 birds. Europe possesses about eighty mammalia; 400 birds; and thirty reptiles. There are, therefore, five times as many birds as mammalia in the northern temperate zone. In the southern temperate zone, the ratio of the mammalia strikingly agrees with that of birds, being as 1 : 4·3. As we proceed towards the torrid zone, birds and reptiles rise above the mammalia even to a greater extent. Some of these numbers have been greatly increased. "According to the average estimates of several of the most distinguished entomologists, whose opinion I have been able to obtain, the number of insects at present described, or contained in collections without being described, may be stated as between 150,000 and 170,000 species. The rich collection at Berlin contains fully 90,000, among which there are about 32,000 beetles. Travellers have collected an immense quantity of plants, in remote regions, without bringing with them the insects living upon them, or in the neighbourhood. If, however, we limit these numerical estimates to a definite portion of the earth's surface that has been the best explored in regard to its plants and insects—as, for instance, Europe—we find the ratio between the vital forms of phanerogamic plants and those of insects changed to such a degree, that while Europe counts scarcely 7,000 or 8,000 phanerogamia, more than three times that number of European insects are, at present, known. According to the interesting contributions of my friend Dohm, in Stettin, more than 8,700 insects have already been collected from the rich fauna of the neighbourhood, and yet there are still many *Micro-Lepidoptera* wanting; while the number of phanerogamia found there scarcely exceeds 1,000. The insect fauna of Great Britain is estimated at 11,600. Such a preponderance of animal forms will appear less surprising when we remember that several of the large classes of insects live only on animal substances; whilst others subsist on agaric plants (fungi), and even on those which are subterranean. *Bombyx Pini*, the Pine Spider, the most destructive of all forest insects, is, according to Ratzeburg, infested by no less than thirty-five parasitical *Ichneumonidæ*. . . . . It is an established fact, that if it were possible to ascertain completely, by observation, the number of species of the large phanerogamic families, we should, at the same time, obtain an approximate knowledge of the sum-total of all the phanerogamia on the surface of the earth (that is, the numbers included in every family). The more, therefore, we are enabled, by the progressive exploration of unknown districts, gradually to determine the number of species belonging to any one great family, the higher will be the gradual rise of the lowest limit, and the nearer we shall arrive at the solution of a great numerical vital problem, since the forms, in accordance with still unexplained laws of universal organism, reciprocally limit each other. But is the number of the organisms a constant number? Do not new vegetable forms spring from the ground after long intervals of time, whilst others become more and more rare, and finally disappear? Geology confirms the latter part of this question, by means of the historical memorials of ancient terrestrial life. 'In the primitive world,' to use the expression of the intellectual Link, 'elements, remote from each other, blend together in wondrous forms, indicating, as it were, a higher degree of development and articulation in a future period of the world.' "

Before quitting this department of vegetable life, we must enter into the regions of the lofty palms and gigantic ferns; the former distinguished by the characteristic title of "kings among grasses." Because of their great use to a large portion of the human family, palms take their place in the first rank of the vegetable kingdom; yet have they, perhaps, of any trees the least attracted the notice of travellers. Up to the time of Linnæus, only fifteen species had been described; whilst the Peruvian travellers, Pavon and Ruiz, only added eight to that number. The additions made by Humboldt and his companion, Bonpland, consisted of twenty new species; and they distinguished as many more without being able to procure their blossoms in a perfect state. Kunth, in 1841, was able to describe 356 species; and now that number has been increased to 440 species. The reason assigned for the paucity of numbers ascertained in the species of this graceful plant, is the difficulty of reaching and procuring its blossoms, as most of its kind flower only once a year; and as this period, within the tropics, is usually about the months of January and February, few travellers are likely to be in its regions precisely at this season. The time of the blossoming of particular trees is not unfrequently limited to a few days, so that the traveller would require to be, in a measure, ubiquitous, after his arrival in the region of its growth, to possess himself of many of the blossoms with which the various species of palms are adorned. In an area of 32,000 square miles, there are often not more than three or four species to be found. Who, therefore, can possibly simultaneously visit all the palm regions within the short season allowed for the blossoming of the plant? In marshy or swampy places there are super-additional difficulties in the way of obtaining the blossoms. "They who contemplate distant travels from Europe," exclaims the great traveller we have already frequently quoted, "for the purpose of investigating subjects of natural history, may picture to themselves visions of efficient shears and curved knives attached to poles, ready for securing anything that comes in their way; also of boys who, obedient to their mandates, are prepared, with a cord attached to their feet, to climb the loftiest trees: but they must lay aside their hopes of performing such feats. Unfortunately, scarcely any one of these visions is ever realised; while the flowers are almost unattainable, owing to the great height at which they grow. In the missionary settlements of the river net-work of Guina, the stranger finds himself amongst Indians, who, rendered rich and independent by their apathy, their poverty, and their barbarism, cannot be induced, either by money or presents, to deviate three steps from the regular path, supposing one to exist. This stubborn indifference of the natives provokes the European so much the more, from his being continually a witness of the inconceivable agility with which they will climb any height when prompted by their own inclination—as, for instance, in the pursuit of a parrot, an iguana, or a monkey, which, wounded by their arrows, saves itself from falling by its prehensile tail. In the month of January, the stems of the Palma Real (the *Oreodoxia Regia* of Bonpland and Humboldt) were covered with snow-white blossoms in all the most frequented thoroughfares of the Havannah, and in the immediate vicinity of the city; but although we offered, for several days running, a couple of piastres for a single spadix of the hermaphrodite blossoms, to every negro boy we met in the streets of Regla and Guanavocoa, it was in vain; for, in the tropics, no free man will ever undertake any labour, attended by fatigue, unless he is compelled to do so by imperative necessity."

The palm is a plant of singular elegance and grace; and, in the figurative language of Scripture, is frequently employed to indicate these qualities. The manner of its growth is very remarkable; for, although some of the species attain to the height of the tallest of the forest trees, their structure differs considerably from that of a tree properly so called. The leaves of the young plant spring immediately from the surface of the soil; and it is not until several years have elapsed that any appearance of the stem presents itself. Another peculiarity is, that, after the stem is formed, it never increases in thickness, the growth being always upward, so that it is formed by the previous growth of the green portions of the plant; and as the age of a tree is ascertained by the circle observable in a section of its trunk, so is the number of years of a palm's existence counted by the scars left by the denudation of its annual circle of leaves. Laborde, in his magnificent work on *Arabia Petræa*, thus speaks of a wild palm which he saw near Mount Sinai :—"What appeared to me most worthy of notice was a palm-tree, in its natural state, which we found above Mount Sinai. The palm-tree is always represented with its summit pointed; its leaves bent back, and spreading over its head, from whence gracefully hang dates as bright as coral; and we never imagine that all this elegance is produced by art, and that nature, less refined, has only attended to its preservation. Before us we saw the palm-tree as it had grown for many a year, forming a rampart of its perishing leaves; and again coming to life, as it were, in the midst of its wreck. Neglected by the Arab of the desert, who considers all attempts at cultivation beneath his dignity, the palm-tree, at times, forms impenetrable forests; more frequently, however, it is found isolated near some fountain. It presents itself to the thirsty traveller like a friendly lighthouse, pointing out to him the spot where water is to be found to quench his thirst, and a charitable shade in which to repose."

Respecting that much-admired class of plants called ferns, we can do little more than state, that the conditions most favourable to their growth are those of a genial atmosphere, with plenty of aqueous vapour acting with great uniformity. These are found on the declivities and in the valleys of the Andes, where they flourish even so far south as New Zealand. Between the tropics, where, on the sides of the Cordilleras, climates are superimposed in strata, is found the true region of the fern, occupying a height of from 3,200 to 5,350 feet above the sea-level. In the Mexican highlands, and in South America, they are found rarely lower towards the plain than at a height of 1,280 feet. Arborescent ferns are first mentioned by the traveller Oviedo, who says that there are some which he classes with pine-trees; for they grow as high and as thick. He also speaks of their growing mostly among the mountains (at Haiti), "where there is much water."

There is a peculiarity in connection with the system of some plants, which, in a general introduction of this kind, must not be overlooked: we allude to the repose which these take, or the sleep into which they fall. In this we see, that the alternate state of activity and rest, which seems to be absolutely necessary to preserve the body in health, and the mind in vigour, is not entirely restricted to sentient beings, but pervades the whole economy of nature, whether animate or inanimate. The term sleep, or state of rest, as applied to the vegetable kingdom, is used to denote a peculiar condition of many plants during the night; and is shown by a change in their position, and often by a drooping or folding together of their leaves or leaflets. Thus when twilight steals upon the world, the lupin listlessly drops its slender fingers, as if to take its rest after the labours of the day; while the four o'clock (*Convolvulus Minor*) shuts its azure eyelid in good time in the evening, to reopen it so soon as the sun is well above the horizon. In other plants, the leaves seem as if they would lean against their stems for the night. The circumstance which first attracted the notice of Linnæus to this peculiarity in some plants, occurred in a species of water-lily (*Lotus Ornithopodiordes*). This plant being rare, was estimated highly by its owner; and, a couple of blossoms appearing on it, the gardener was particularly charged to take care that no accident should happen to it until it was thoroughly watched. Other business drove it out of the mind of its possessor until the evening; but, when examined, not a blossom was to be seen upon it. On the third evening, a similar peculiarity was observed. It seemed strange; but, after making a very minute search for the apparently lost blossoms, each was found concealed under three leaves, as if covered with a pent-house, protected from the air, and quite hidden from the sight. "From this," says the great Swedish naturalist, "we may see that the structure of leaves is not fortuitous, but destined, by an Omniscient Creator, to answer some particular end."

Here, however, let us ask what is the great object of the vegetable wealth of the earth?

answer is obvious—to give pleasure, food, clothing, and protection to animal life. In Whewell's *Bridgewater Treatise*, there are some comprehensive passages on this very point; and as they are not too long for quotation, we will here avail ourselves of them. The adaptation of tribes of indigenous vegetables to every climate has, we cannot but believe, a reference to the intention that the human race should be diffused over the whole globe. But this end is not answered by indigenous vegetables alone; and in the variety of vegetables capable of being *cultivated* with advantage in various countries, we conceive that we find evidence of an additional adaptation of the scheme of organic life to the system of the elements. The cultivated vegetables which form the necessaries or luxuries of human life, are each confined within limits narrow when compared with the whole surface of the earth; yet almost every part of the earth's surface is capable of being abundantly covered with one kind or other of these (? the Sahara and other deserts). When one class fails another appears in its place. Thus corn, wine, and oil have each its boundaries. Wheat extends through the old continental world, from England to Thibet; but it stops soon in going northwards, and is not found to succeed in the west of Scotland; nor does it thrive better in the torrid zone than in the polar regions. Within the tropics, wheat, barley, and oats are not cultivated, except in situations considerably above the level of the sea; the inhabitants of those countries having other species of grain, or other food. The cultivation of the vine succeeds only in countries where the annual temperature is between 50° and 63°. In both hemispheres the profitable culture of this plant ceases within 30° of the equator, unless in elevated situations, or in islands, such as Teneriffe. The limits of the cultivation of maize and of olives in France, are parallel to those which bound the vine and corn in succession to the north. In the north of Italy, west of Milan, we first meet with the cultivation of rice, which extends over all the southern portion of Asia, wherever the land can be, at pleasure, covered with water. In great part of Africa, millet is one of the principal kinds of grain.

Cotton is cultivated to latitude 40° in America; but extends to Astrachan, in latitude 46°, in Europe. The sugar-cane, the plantain, the mulberry, the betel-nut, the indigo-tree, the tea-tree, repay the labours of the cultivator in India and China; and several of these plants have been transferred, with success, to America and the West Indies. In equinoctial America, a great number of inhabitants find abundant nourishment on a narrow space cultivated with plantain, cassava, yams, and maize. The cultivation of the bread-fruit tree begins in the Manillas, and extends through the Pacific; the sago-palm is grown in the Moluccas, the cabbage-tree in the Pelew Islands. In this manner the various tribes of man are provided with vegetable food. Some, however, live on their cattle, and thus make the produce of the earth only mediately subservient to their wants. Thus the Tartar tribes depend on their flocks and herds for food; the taste of the flesh of the horse seems to belong to the Mongols, Finns, and other descendants of the ancient Scythians. The locust-eaters are found now, as formerly, in Africa. Many of these differences depend upon custom, soil, and other causes; but many are connected with climate; and the variety of the resources which man thus possesses, arises from the variety of constitution belonging to cultivable vegetables, through which one is fitted to one range of climate, and another to another. We conceive that this variety, and succession of fitness for cultivation, show undoubted marks for a most foreseeing and benevolent design in the Creator of man and of the world.

Leaving the vegetable kingdom, we will now consider the habits and peculiarities of some of the multitudes of insect life with which it swarms. The agility and strength of some of these tiny creatures are enormous. Ants can carry loads forty or fifty times heavier than themselves. Linnæus has calculated that the melolontha is, relatively to its size, six times stronger than the horse; and he asserts, that if the proportional strength of the lucanus, or stag-beetle, had been given to the elephant, it could have torn up the largest trees by the roots, and, like the giants of mythology, have hurled huge rocks against its assailants. One of the most extraordinary insects is the African fly, named Zimb, to which reference is made in the recent explorations of Dr. Livingstone. "We cannot," says Bruce, "read the history of the plagues which God brought upon Pharaoh by the hand of Moses, without being struck with a singularity—a very principal one—which attended this plague of the fly. It was not till this time, and by means of this insect, that God said he would separate his people from the Egyptians; and it would seem that then a law was given to them, that fixed the limits of their habitation. It is well known that the land of Goshen, the possession of the Israelites, was a land of pasture, which was not tilled or sown because it was not overflowed by the Nile; but the land overflowed by the Nile was the black earth of the valley of Egypt; and it was here that God confined the flies. It shall be a sign, he says, of this separation of the people which he had then made, that not one fly should be seen in the sand or pasture-ground, the land of Goshen; and this kind of soil has ever since been the refuge of all cattle emigrating from the black earth to the lower part of Atbara. Isaiah, indeed, says that the fly shall be in all the desert places, and, consequently, the sands: yet this was a particular dispensation of Providence to answer a special end—the desolation of Egypt—and was not a repeal of the general law, but a confirmation of it; it was an exception for a particular purpose and a limited time."

The effects of this insect upon the universal world of quadrupedal life in Africa is something fearful to contemplate. No sooner is the buzz of this pest heard, than all the cattle forsake their food, and run madly over the plains, until, exhausted by fear, fatigue, and hunger, they perish. There is no escaping its terrible means of torture but by quitting the black earth, and hurrying to the sands of Atbara. Here safety is found, and here they consequently live, apparently knowing, instinctively, that they are free from the molestation of their enemy. Even the camel, though possessed of a thick skin, and covered with shaggy hair, is forced to take refuge in Atbara; for when once attacked by this insect, his head, legs, and body become charged with large bosses, which putrefy, then break, and, finally, destroy the animal. From the great bulk of the rhinoceros and elephant, and the necessity to them of large quantities of food and water, they cannot flee from the tortures of the zimb; but they are compelled to roll themselves in mud or mire, to form a sort of armour over their bodies, to enable them to bear or resist the punctures made in their flesh by this winged tormentor.

The size of this insect is very little larger than a bee, but of a thicker proportion; whilst the wings, which are broader than those of a bee, are placed separate, like those of the common fly. These have the appearance of fine gauze, and are destitute of all colour, and without spot or speck upon them. The head is large, the upper jaw sharp, having at its end a strong pointed hair of about a quarter of an inch long. To the under jaw two pointed hairs of a similar description are attached; and these, when united, make a resistance to the fingers nearly equal to that of a strong hog's bristle. The terrifying buzz of this *plague* is described as having a peculiarly jarring sound, with a certain hum, caused, it is supposed, by the vibration of the three formidable hairs at its mouth.

Whilst the zimb seems to be carnivorous, or blood-sucking, in its habits, there is scarcely a plant that is not the peculiar habitat of one or more distinct species of insect; and not unfrequently the same plant is infested with several species. For example, the oak is fed upon by a variety of insects, besides the numerous species of *Cynips;* and this is not a solitary example. Insects themselves, however, or the diseases of which they are the cause, frequently become important articles in common food and medicine. Instances are evident in the *Coccus* (the cochineal insect); the *Lac* insect; and the *Cantharis* (Spanish fly); the nutgalls of the Levant, and the gall-apples of the *Salvia Pomifera.* On the other hand, many of the species are not only extremely destructive, but remarkably prolific. As an instance of the former, witness the living clouds of locusts which occasionally ruin, and render destitute of vegetation, large tracts of country in the East. One of these clouds will strip whole forests in one visitation. They will cover an area of several thousands of square miles, and inflict incalculable miseries upon mankind, as was the case when the kingdom of Massinissa was scourged by them, and when 800,000 persons perished of famine. Captain Basil Hall tells us, that one of these clouds was three whole days and nights, without apparent intermission, in passing over Smyrna; that, according to accurate observations made at the time, it was 300 yards in depth, upwards of forty miles in width, and nearly 500 in length. He calculated that the lowest number in this enormous swarm must have exceeded 168,608,563,200,000; and, in order to give the mind a clearer conception of its immensity, Captain Beaufort, whose ship was lying at Smyrna at the time, determined that, if formed into a heap, it would have exceeded, in magnitude, more than one thousand and thirty times the largest of the Egyptian pyramids; or if they had been placed on the ground close together, they would have encompassed the globe with a band a mile and a furlong wide. Such a multitude, collected in one mass, is scarcely conceivable. The mind feels some degree of difficulty in realising it; but history informs us, that when these insect armies are overwhelmed by storms or tempests, their bodies sometimes cover large tracts of country to a depth of four feet; and when blown into the sea, they have formed a bank along the shore three or four feet in height, and fifty miles in length.

We need not, however, travel to the East to become acquainted with the havoc of which insect life is capable of perpetrating, when we have instances of this even at our own doors. We have our *Aphides*, or rose-bugs; our *Coccinellæ*, or hop-destroyers; the flies of our turnip-fields; and different kinds of timber-grubs—not certainly so numerous as locusts, still sufficiently so as sometimes to prove themselves very destructive The *Cossus Ligniperda*, or great goat moth, is, in the hands of nature, a most powerful instrument of destruction; and the rapidity with which this power is developed is something wonderful. Its larvæ have, by experiment, been proved to increase in weight 140 times in an hour; and, when full grown, to be 72,000 times heavier than when hatched from the egg. But even its power to destroy, and its rapidity of multiplication, are far inferior to those of the *Termes Bellicosus*, which lays sixty eggs *per* minute, and which it will continue to do without intermission for a long space of time. A female, therefore, laying at the rate of 3,600 eggs *per* hour, will, it has been calculated, in the course of a single day, produce 86,400. Even a single female of the common *flesh-fly*, which is not the most fruitful of its class, will give birth to 20,000 young; so that there is some justification for the assertions of Linnæus and Wilcke, that three flies of *Musca Vomitaria* could devour a dead horse as quickly as a lion; and that even the smallest insects can perpetrate, when directed by necessity, more ravages, within a given time, than the very largest of the brute creation.

Of the *ant* tribe, it is remarked by Mr. Kirby, that they are almost equally interesting with that of the bee, for their extraordinary industry. It would appear that they are universal collectors; seeking their food wherever it can be found. Everything that comes in their way, whether animal or vegetable, living or dead, is suitable for their purpose; and the paths to their nests are, during their hours of labour, continually darkened by the busy crowds that are moving to and fro. Their great design seems to be, to remove everything that appears to be out of its place. "I have seen," he says, "several of them dragging a half-dead snake, about the size of a goose-quill. They do not, however, like the bees, usually store-up provisions, but they will imbibe sweet juices from fruits, and also from the plant-lice, which may be called their cows. However, almost all their care and labour are connected with the nurture and sustenance of their young." All the singularities of these interesting insects, and those of others, will be found amply detailed in the following pages.

Passing from insect life to that of the reptiles, we enter a region attended not only with much danger, but, to a mind not inspired with a strong desire to investigate the peculiarities incident to the wonderful varieties of animal existence, often accompanied with disgust. By the sides of rivers, and amongst the swamps of the tropics, crocodiles, tortoises, and boas find their homes. These and many of the smaller species of serpents lie torpid throughout the hot and dry season of the year, as other animals hibernate during the winter. It is related, that the natives of the hot climate of South America are frequently bitten by serpents, suddenly awakened whilst engaged in seeking for the dormant terekai, or land tortoises. These, with the serpents, bury themselves in the mud to a depth of about sixteen inches, and there take what Humboldt calls their *summer sleep*. Thus, in nature, we meet with an enfeeblement of certain vital functions belonging to many different classes of animals, even without the same peculiarity exhibiting itself in organisms closely allied, and belonging to one and the same family. Although the northern glutton is allied to the badger, it does not, like the latter, hibernate during the winter; whilst, according to Cuvier, the dormouse of Senegal, which had probably never known what it was to sleep throughout the winter in its tropical home, fell into a state of hibernation at the beginning of winter, the first year it was brought to Europe. Remarking on this subject, Humboldt says—"This enfeeblement of the vital functions and vital activity passes through several gradations, according as it extends to the processes of nutrition, respiration, and muscular movement, or induces a depression of the cerebral and nervous systems. The winter sleep of the solitary bear and the badger is not attended with rigidity, and hence the awakening of these animals is easy, and, as I frequently heard in Siberia, very dangerous to the hunter and country people."

Small serpents and snakes are numerous both in Northern America and Australia. In a long excursion through the former, the writer has awoke, at the root of a tree, with a snake two feet long nestling between his arms as they were folded over his breast. It had probably crept there, during the night, for the sake of warmth, as it was drawing towards the fall of the year. In Rhode Island, close by the edge of a forest, he killed one about three feet long, whilst engaged in the painfully pleasing operation of endeavouring to swallow a large bullfrog. The latter was set free with its life, but in such a state of compression, that in place of leaping, it could only crawl away from the scene of its misfortune. Britain is now comparatively free from venomous reptiles; but this is not the case with Australia. There they abound, especially in those swampy places which are shunned by man as being incapable of ministering to his necessities. They have not the strength, nor are they associated in the mind with the terrific feats of the larger species of serpents; but what they want in power, they have in poison. The snakes most common to New South Wales, are the diamond snake, the black, the gray, the brown or earth-coloured snake, the whip, and the yellow snakes. The diamond snake is a beautiful creature—if beauty can, in the mind, be associated with a snake—and is not venomous. "The first encounter I had with a snake of this description," says a writer of sketches in this country, "was under peculiar circumstances. I had fixed my stand, and was in the act of adjusting an instrument to take an observation, when my man called out, 'Stand back, sir—a snake!' and having moved backwards a few paces, he pointed under the stand, when I perceived an immense snake, snugly coiled round and round. Having quietly removed the instrument, we each armed ourselves with a tolerably-sized stick, and very soon, as I imagined, killed it. It was a brilliant creature, and I sent it back to the encampment with the intention of preserving it. On my return to the tents in the evening, I had it stretched out, and placed two heavy flat stones upon its head and tail. It measured nine feet eight inches. At night, on going out to see the snake, it was gone; nor could we find it, after searching for some time with lighted bark. Next morning, however, on throwing my legs from the stretcher on which I had slept during the night, I perceived my friend coiled up immediately under me; and, as it appeared very inactive, from being so much bruised before, I soon despatched it. It is most probable that the heat of the fire was the cause of its reviving and moving off." The same cause led the snake to secrete itself under its destroyer.

The great family of boas are distinguished by their not being venomous, by the habit of taking up their abode in marshy places, and by attaching themselves by their tails to trees, near the edges of waters, when about to seize their prey. They are common to South-eastern Asia, Africa, and South America. The names anaconda and boa constrictor, strictly speaking, belong to South America; although they are frequently loosely applied to other species. The largest African species are called pythons. The marine snakes of the Chinese seas are venomous, and live chiefly in the ocean, where they are found in large shoals. When the boa seizes its prey, it covers it with saliva, which is invested with the singular power of rapidly promoting decomposition. Whilst swimming, as it is frequently seen in the Orinoco, it holds its head above the water, like a dog, and moves with considerable velocity. It is said that it attains to a length of forty-eight feet; but we believe this statement has not been sufficiently substantiated. The largest skins which have been measured in Europe have not been over twenty-three feet. Respecting the lizard, frog, and other reptiles, ample details from the latest sources will be found in the pages of the following work.

Fishes form an order, respecting the habits of which we are necessarily less acquainted than with any of the other departments of the animal kingdom. It was formerly thought that the swimming-bladder of these creatures was filled with air wholly unmixed with oxygen; but the experiments made by Erman, and confirmed by Humboldt, prove that the swimming-bladder of fresh-water fish never contains nitrogen in a state of entire purity. In sea-fish, as much as 0·80 parts of oxygen have been found; while, according to the views of Biot, the purity of the air depends on the depth at which the fishes live. Perhaps one of the most singular of all fishes, from the whale to the sprat, is the snake-like gymnotus, or electric eel. There are innumerable anecdotes illustrative of the extraordinary power of this fish, and the wonderful *fire-arm* with which it is endowed, either for self-defence or the destruction of other animals. In some of the waters in South America, it proves extremely destructive to animal life. "The marshy waters of the Bera and Rastro," says Humboldt, "are filled with innumerable electric eels, who can, at pleasure, discharge from every part of their slimy, yellow-speckled bodies, a deadly shock. This species of gymnotus is about five or six feet in length. It is powerful enough to kill the largest animals when it discharges its nervous organs at one shock in a favourable direction. It was once found necessary to change the line of road from Urituca across the steppe, owing to the number of horses which, in fording a certain rivulet, annually fall a sacrifice to these gymnoti, which had accumulated there in great numbers. All other species of fish shun the vicinity of these formidable creatures. Even the angler, when fishing from the high bank, is in dread lest an electric shock should be conveyed to him along the moistened line. Thus, in those regions, the electric fire breaks forth from the lowest depths of the waters."

Whatever may be the habits of the ocean mammals, other fishes, and *infusoriæ*, which help to make up the wonderful variety of species which inhabit the ocean, they are, in so far as research has made them manifest, and established the uniformity of their existence, detailed in the following pages; which, therefore, supersedes the necessity of our dwelling longer upon them here. In the perusal of these, the great object should be to instruct ourselves in that wisdom which will lead us to the contemplation of their INFINITE DESIGNER, whose exhaustless variety and power, as displayed in his great works, show us how remote we are from Him: yet, of all terrestrial beings, the noblest of all species. It should teach us humility, whilst inspiring us with hope that we may stand in the presence of Him whose ceaseless benevolence and beneficence are spread out in constant action for the sustainment of life in every division of the globe; and it should bring us to the consideration of our own insignificance, however great the greatest of us may be, with Him who made the earth, the seas, and the sky, and all things that therein are.

key sc

THE BARBARY APE AND OURANG-OUTANG.

The Barbary Ape is a native of Northern Africa, and possesses the usual features and characteristics of the species to which it belongs. Its arm, hand, and ear resemble those of the human being, but the interest which attaches to its history pales before that which belongs to the Ourang. Professor Owen informs us, that for about two centuries naturalists have been cognizant of a small ape, tailless, without cheek-pouches, and without the ischial callosities; clothed with black hair; with a facial angle of about 60°, and of a physiognomy milder and more human-like than in the ordinary race of monkeys—less capricious, less impulsive in its habits, more staid and docile. This species, brought from the west coast of Africa, is that which our anatomist, Tyson, dissected. He described the main features of its organisation in his work, entitled *Ourang-Outang, sive Homo Sylvestris*, published in 1699. He called it the *Homo Sylvestris*, or *Pigmy*. It is noted by Linnæus, in some editions of his *Systeme Naturæ*, as the *Homo Troglodytes*. Blumenbach, giving a truer value to the condition of the innermost digit of the hind foot, which was like a thumb, called it the *Simia Troglodytes*. It afterwards became more commonly known as the "Chimpanzee."

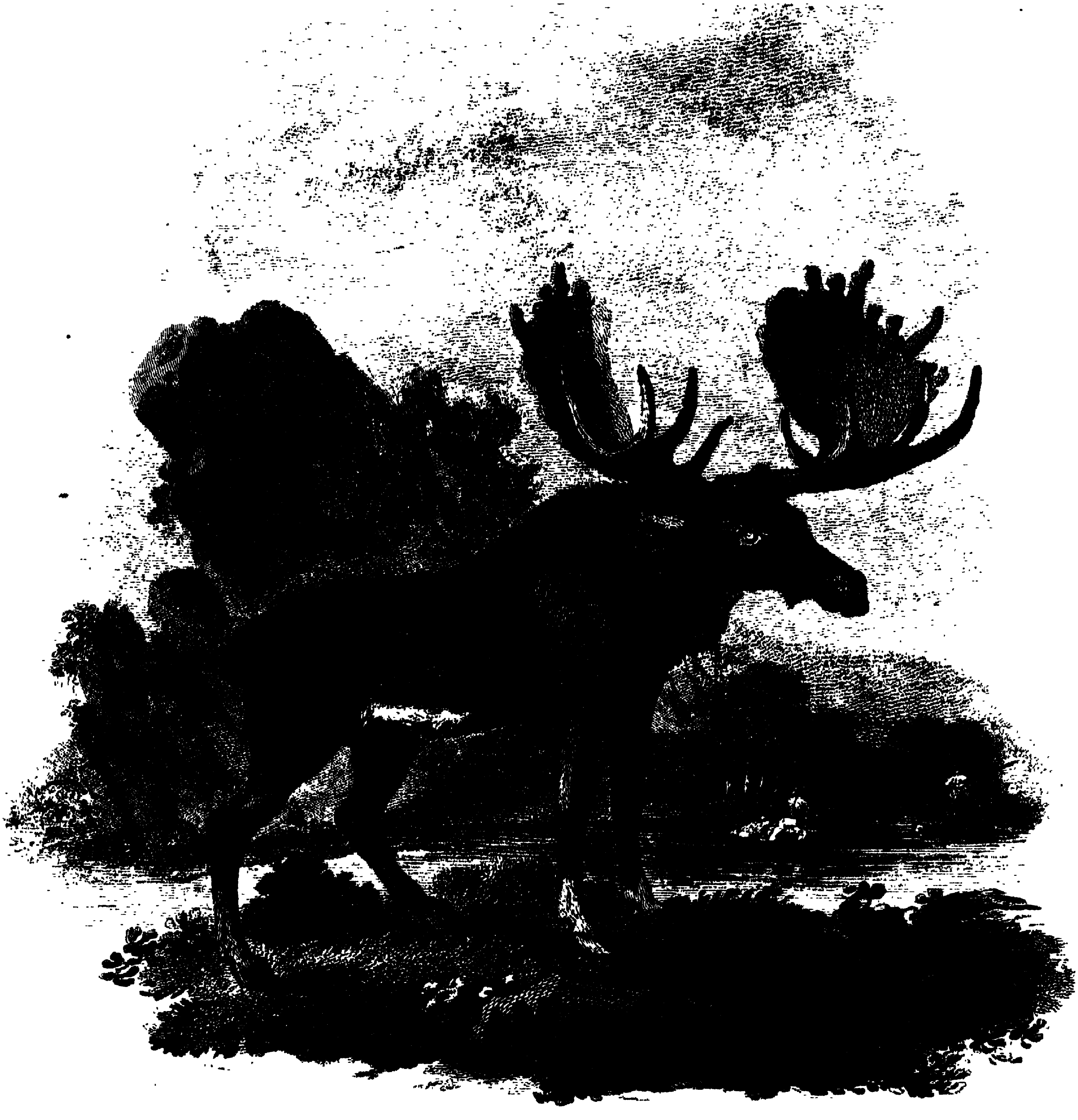
Subsequently naturalists discovered an Ape of a similar description, possessed of great docility, and with a melancholy, world-weary-like character of features. Such an expression we often see in the starvation haunts of London life. It was imported from Sumatra or Borneo, where it was designated Orang, which, in the native Bornean language, signifies "Man," with the distinguishing adjunct of Outan, meaning "Wood-man," or "Wild man of the woods." This singular-looking creature differed from the Pigmy of Tyson, inasmuch as it was covered with hair of a reddish-brown colour, and by having the anterior or upper limbs much longer in proportion, and the thumb upon the hind feet much less. In the catalogue of the Zoological Society, it was entered as the *Simia Satyrus*. Baron Wurmb, a governor of Batavia, had, in 1780, transmitted to Holland the skeleton of a large kind of Ape, tailless, like this small species from Borneo; but with a much-developed face and large canine teeth, and bearing thick callosities upon the cheeks, giving it, upon the whole, a very baboon-like physiognomy; and he called it the Pongo. Since then, the gorilla has been discovered; but of it a description has been given in the General Introduction of this work.

Between the chimpanzee and the Ourang there is a great physical resemblance; but the arms of the former, though long, are shorter than those of the latter, and the thumbs of the hinder hands are more fully developed, and furnished with a nail. The hands of both the fore and the back limbs are much narrower and longer in the Ourang than they are in the chimpanzee; and in the latter the backs of the fore-hands are nearly naked to the wrists. In the Ourang these are covered with hair; and, in both, the hair of the fore-arms is reverted to the elbow. In so far as we have seen, the hind limbs of the chimpanzee are better developed than those of the Ourang; and their action possesses much greater steadiness and precision. This is owing to the absence of the *ligamentum teres*, or binding ligament of the hip-joint, which, while allowing the utmost freedom to the limbs, has a tendency to render them less suitable for walking on the ground, or as means of bodily support. The ears of the chimpanzee are large, and spread out from the head; but in the Ourang they are small and close. In the chimpanzee, the hair radiates from a centre, and the forehead is low and flat: in the Ourang, the hair of the head is all directed forwards, there being no centre of radiation; the forehead, too, is large and convex, with a slight perpendicular elevated line, indicating the suture of the two frontal bones. In both animals the lips have the power of great projection; but the chin is larger in the chimpanzee, and more prominent. The cheeks are, also, more wrinkled; and the muzzle being furnished with some thinly scattered white hairs, it suggests the idea of an old man, fond of the playful tricks of a child. In the Ourang, the chin recedes, at once, from the protruding lips, and the muzzle is entirely destitute of the mark of age, in the form of white hairs. Between the voices of the animals there is an equally wide difference. While the chimpanzee utters deep guttural sounds, as well as cries of considerable strength, the voice of the Ourang, when displeased or disappointed, takes the sound of a plaintive, feeble whine or low scream, which it only gives way to when disappointed or displeased.

In Borneo the adult Ourang is an object of much terror to the natives. This animal will sit for hours, under the apparent influence of a listless apathy, among the topmost branches of a tree, like a hermit in some solitary seclusion, and unless roused will not move. In an unexcited state his motions are slow and heavy; but when attacked, his agility among the branches is astonishing; while he will defend himself with the most unswerving courage. This is a feature in the disposition of the gorilla. His physical strength, disclosed by the enormous development of his chest, is prodigious; and his long sinewy arms enable him, while swinging by his hind hands from a branch overhead, to grapple with his antagonist. Unless provoked, however, he is rarely, if ever, the assailant, but is quiet and peaceable. His abhorrence and dread of the tortoise is well known. On a small tortoise being introduced to the presence of one, it stood aghast with horror, and surveyed the crawling thing with the utmost aversion; but it would appear, that familiarity with the sight of tortoises soon dissipates their disgust, and they come to look upon them without any apparent apprehension.

In the Bible the monkey or Ape tribes are not often mentioned, very likely because su h animals are not indigenous to Palestine. Whatever knowledge, therefore, was possessed by the Scriptural writers, must have been obtained either from the descriptions of sailors, or from the sight of some specimens imported, probably, as curiosities from different lands. Such specimens, however, must have been exceedingly rare, or they would not have been introduced as adjuncts to the riches of Solomon, who was not only the wisest, but the wealthiest sovereign of his time. "There is scarcely any familiar animal, bird, reptile, or insect," says Mr. Wood, "which is not used in some metaphorical sense in the imagery which pervades the whole of the Scriptures. For example, the various carnivorous animals, such as the lion, wolf, and bear, are used as emblems of destruction in various ways; while the carnivorous birds, such as the eagle and hawk; and the destructive insects, such as the locust and the caterpillar, are all similarly employed in strengthening and illustrating the words of Holy Writ."

It is impossible to decide with precision whence the monkeys, or Apes, that were seen in Palestine were brought; but in importing these animals, with gold and ivory, Solomon only followed a custom in practice at the period of his reign. "He, however, on whom the gift of wisdom had been especially bestowed, would have another motive (for importing them) besides ostentation or curiosity. He was learned in the study of that science which we now call Natural History. It is, therefore, extremely probable, that he would not neglect any opportunities of procuring animals from distant lands, in order that he might study the products of countries which he had not personally visited; and it is not likely that so conspicuous an animal as the monkey (the Wanderoo is referred to) would have escaped the notice of those who provided the cargo for which so wealthy a king could pay, and for which they would demand a price proportionate to its variety."



Elk.

THE ELK.

THE Elk has a short neck; and Sir Charles Bell, in his *Bridgewater Treatise*, informs us that "it is a strange, uncouth animal, from the setting on of its head." The weight of the horns is so enormous, that if these were further extended from the body, on an elongated neck, the body would be overbalanced. He further says, that when we observe the want of correspondence between the length of the fore-legs and that of the neck, it becomes an interesting circumstance to find that the animal feeds off the sides of rocks, and does not browse upon the herbage at its feet. A remarkable proof how unable this animal is to feed in the common way, was afforded by an accident which befel a fine specimen in the Zoological Gardens. His food having been unintentionally scattered on the ground, he was obliged, in order to reach it, to extend his fore-legs laterally. In this position his foot slipped, when he dislocated his shoulder, and died of the accident.

The Elk takes its place among the native zoology of North America, and is there hunted for the sake of both its skin and its flesh. On many parts of that continent there are springs of water, more or less impregnated with salt; and these, in the common vernacular, are denominated "Salt-licks," or "Deer-licks;" for where one of them is found in the wilderness, it is much resorted to by the deer of the district. Indeed, it has, long ago, been ascertained, that not only the Elk and deer generally have a great partiality for salt, but also the domestic farm-stock, especially sheep and cattle. In the long summer mornings and evenings, the hunters lie in ambush in the neighbourhood of these "licks," and shoot down the deer which resort to them for the purpose of gratifying their tastes with the saline particles with which they are impregnated. In some instances, where salt is cheap, the hunters endeavour to make artificial "licks," by sprinkling salt in the well-head of some tiny oozing spring; and by continuing this operation for some time, they may probably attract a few of the antlered species of the plain: but the experiment is very uncertain in its results, and we infer, on the whole, scarcely worth the trouble. In the south-western states, these salt-springs are frequently termed "Elk-licks," from the circumstance of their being haunted by these animals; but the Elk, in a great measure, has been banished from the eastern or Atlantic side of the Alleghany mountains.

The above, however, is only one of the modes which the Americans pursue in chasing the Elk. It is, from its very nature, mostly confined to certain localities; and from the same cause, we should presume, not very gratifying to those who hunt either for pleasure or profit. Those hunters who engage more frequently in the sport, and who have their abodes in the backwoods, adopt different means to take him. In those parts of the country where "ponds" or small lakes abound, or where there are tolerably large rivers flowing through them, the hunter supplies himself with a couple of any sort of hounds, which have the quality of "giving tongue" when on the trail of a deer—not, however, with the expectation that his dogs are such as would run down the fleet-footed hind, but that, by their baying, they may excite the fear of the animal, which will then make directly for the water as a place of refuge. Now is the chance for the hunters, who are lying under cover, patiently waiting his appearance. They then take their aim, and usually despatch him. But should the Elk have taken to the water, and two or three of the men be in canoes, they will not fire, but paddle swiftly after their game. On these occasions he is nearly always overtaken, as, from the form of his limbs, he is unable to swim very fast. Should he, however, appear likely to regain the shore before he can be overtaken, the rifle is at once brought into use, when the pursuit is soon at an end; but if the chase seems certain of terminating in an easy capture, it is continued until the canoe is alongside of the victim, whose throat is immediately cut with a hunting-knife, and the pellucid waters of the river crimsoned with his blood. The carcass is then towed ashore, and forthwith disembowelled, skinned, and divided into as many parts as there are individuals engaged in the capture. Such is the method practised in the months of summer and autumn; but in winter, when the rivers and lakes are covered with ice, this cannot be done.

When a hunter goes after his game alone, he pursues his way with great caution, taking the advantage of every covering thing, as the domestic cat does when hunting any of the smaller feathered tribes. All his detective qualities are on the alert. He sees and hears with amazing acuteness. Should he, in the early part of his course, succeed in shooting down an Elk, he immediately disembowels him, and, with the help of a forked pole, hangs the body up against a tree, where it is left until a more convenient opportunity for transporting it to the hunter's abode. "I have known a solitary hunter," says one of the craft, "kill eight deer in a day's excursion in the forest; but this was a very uncommon piece of good fortune; for I have frequently known the most renowned hunters toil several days without succeeding in capturing a single buck or doe. Although the deer are exceedingly shy, yet where the country is but thinly inhabited, they may, sometimes, be seen in the retired meadows and pastures; and still more frequently upon the crops of young wheat, while the plants are green and tender. My first essay in backwood deer-hunting was in a field of young wheat, in the latter part of autumn. This field was surrounded by dark forests, and at a considerable distance from any human habitation. Finding that the deer were in the frequent habit of coming to pasture upon the young wheat, morning and evening, I collected sufficient branches from the neighbouring pine-forest to enable me to erect a screen or hut near the centre of the wheat-field, wherein to conceal myself and my rifle. I had passed two or three evenings in my lone hut without any of the wily creatures approaching within what I considered a proper distance; and had almost began to despair of ultimate success, when one evening I espied a fine tall buck, with a pair of splendid antlers, coming in an almost direct line towards my hiding-place. Presently two others, a buck and a doe, bounded over the fence into the inclosure, and made their way in the direction of the one already within rifle distance. I shall never forget the excitement that I experienced during the few moments of their approach; and the three deer had nearly joined company before I could bring my long rifle into the necessary position to bear upon them, or rather upon the fine old fellow, for I had set my mind upon him; and while I was thus preparing to fire, he turned his broadside full towards me; while the doe, parting from the other buck, crossed the direct line of my piece, nearly twenty paces in the rear of the former. At the instant that she disappeared behind the shoulder of the old buck, I fired; and although I saw that I had hit him behind the shoulder, he bounded across the field with the speed of an arrow. A few seconds brought him to the tall fence by which the field was inclosed, and he made a spring to clear it; but it was his last effort, and he fell back from the upper rails of the fence, quite dead. The doe never moved after the ball struck her; for it had passed directly through her heart. This certainly was a good beginning. I considered it little short of a miracle, thus shooting two deer with one ball; but I lived to witness several similar exploits, and some where much greater dexterity was required; for I have witnessed an American, a mere youth, shoot down two bucks at one shot, when at full speed, and running in opposite directions."

THE ELEPHANT.

We once rode upon an Elephant in the London Zoological Gardens, and never had such a comfortable ride in all our lives. To be sure the distance we went over was not great, but it was sufficiently so to impress us with the idea that elephantine riding was a very agreeable kind of exercise. In Oriental countries it must be much enjoyed; and as this majestic-looking brute seems to be imbued with an innate sense of the magnitude of his proportions, he becomes the personification of dignity itself when caparisoned in the magnificent trappings of the Great Moguls. What with his curved, snowy, projecting tusks; his fine long nose (proboscis) emanating in the characteristic line of Grecian beauty directly from his forehead; his colossal pillars of limbs, like columns of the Egyptian Thebes, supporting his gigantic frame—he is certainly a creature which justifies alike quadrupedal envy and human admiration. Of his peculiar form, Sir Charles Bell, in his *Bridgewater Treatise*, thus speaks :—

"When we stoop forward, as in reading a book which lies on the table, we may feel a ligament extending from the projecting part of the spine, between the shoulders to the back part of the head. It suspends the head, and relieves the muscles. But as man generally carries his head erect, this ligament is not to be compared in strength with the corresponding part in quadrupeds, where, from the horizontal position of the spine, the head always hangs. It is long and strong in the horse; and the admirable thing is, the accurate adjustment of the elasticity of this ligament to the weight and position of the head, which is balanced by it as on a steelyard. With this circumstance in our mind, let us observe the peculiar form of the Elephant. One of the grinders of this animal weighs seventeen pounds; and of these there are four: the jaws must be provided to give socketing to such teeth, and must have space and strength to give lodgment and attachment to muscles sufficient for moving this grinding machine. The animal must have its defence too. Now each of the tusks sometimes weighs as much as 113 pounds. To support this enormous and heavy head, the seven vertebræ of the neck of this animal (the same number that we find in the giraffe) are compressed in so remarkable a manner as to bring the head close upon the body, making it, as it were, a part of the body without the interposition of the neck. But the animal must feed; and as its head cannot reach the ground, it must possess an instrument like a hand, to minister to the mouth, to grasp the herbage, and lift it to its lips. This instrument we see in the proboscis, or trunk."

Docile and gentle as the Elephant is generally esteemed to be, in its wild state it is necessarily sometimes forced into fierce combat with some of the largest species of the brute creation. The lion, the tiger, and the rhinoceros are not unfrequently its antagonists. When it meets with this last, the conflict is usually terrific; and as the rhinoceros is the least intelligent of all the larger quadrupeds, he stands his ground to the very last. He is possessed of the usual unyielding stubbornness of *unsentimental* brute strength. Even though surrounded by a herd of Elephants, he will resist them all until destroyed in the midst of them. Before this happens, however, one or more are sure to have fallen before his horned snout. It is not therefore without extreme apprehension and reluctance that the Elephant approaches him. On their first rencounter, should the rhinoceros make good his stroke, it is certain death to his adversary. His horn ploughing through the side, exposes the intestines, and the dusky monster of the woods falls dead at his feet. If, on the other hand, the Elephant is successful in evading the rush of his foe, he receives him on his tusks, and inflicts a wound so severe as to disable the rhinoceros from renewing the combat. In these fights, however, the Elephant generally gets the worst of it, arising from the natural timidity of its disposition. The mailed rhinoceros is therefore rarely molested, but is suffered to roam the jungle at large, both the lion and the tiger avoiding him as an antagonist too fierce and powerful to be provoked without peril.

Although, in a domesticated state, the Elephant has been employed from the remotest antiquity, yet, unlike other animals reclaimed by man, it does not breed in captivity; or, at all events, not in sufficient numbers to balance the mortality of those employed: accordingly, hunting the Elephant in the East, especially in the island of Ceylon, is a constant sport. In Africa it is not at all employed for domestic purposes; but it is plentifully destroyed for the sake of its tusks. In Abyssinia the Elephant is chased by a couple of men called Agageers; one managing the horse upon which they are both mounted, and the other carrying a short sword, part of the blade of which is covered with whip-cord, to admit of its being held in the hand. These men having selected an Elephant from the herd, or having fallen-in with a single one, attract his attention by at once riding up to him and endeavouring to provoke him. When this has been done, the excited animal pursues them. The hunter then swiftly turns his horse, and allows his armed companion to slip down just immediately behind the Elephant. The sinews of its *houghs* are severed with one stroke, when the swordsman is again mounted behind his companion, preparing to repeat a similar operation. It sometimes happens that the Elephant overtakes the hunters, and seizing both them and the horse in his trunk, throws the whole to the ground, and tramples them to death. The dismounted Agageer, too, is occasionally overtaken by the Elephant before he has been able to regain his seat behind his companion, and trampled to death by the enraged beast.

If man desires to reap where he has sown, it is absolutely necessary to exterminate the wild Elephant, or, at least, to banish it from cultivated neighbourhoods, as the industry and expectation of a whole year may be rendered useless in the course of a single night, by a troop of these animals making a raid upon the crops of the farmers. In the remoter districts of Southern Africa, the Elephant multiplies so fast, that herds of from 2,000 to 3,000 are sometimes witnessed at one time on the banks of the rivers, where they have gone either to bathe or to slake their thirst. The quantity of vegetable produce necessary to the support of such an army of monsters, to say nothing of the other tribes of vegetable-feeding animals, must be something enormous, and suggests the richness and fertility of the equatorial regions in which they hold their habitat. The progress of such hosts through the immense and intricate forests, is marked by general devastation. Trees are either uprooted or entirely stripped of their foliage: the branches are broken and trampled under foot; and no impediment is suffered to stand in the way of satisfying the cravings of their appetites. What are the corn-fields or rice-grounds of a landed proprietor to a hungry army of monsters like these? A mere bite. But the loss would be, not so much in what they might eat, but in what they would destroy during the revel of their enjoyment. It is on this account that the first efforts of a new settlement, in countries where the Elephant is indigenous, are directed to the prevention of such a calamity; and Elephants are now rarely found in the immediate vicinity of long-established European settlements.

Hippopotamus.

THE HIPPOPOTAMUS.

THE tropics and the sub-tropics are the climates of terrestrial monsters. Elephants, lions, tigers, crocodiles, hippopotami, boas, and other creatures, all dwell beneath the rays of the hottest suns. In the great rivers of Africa, South America, and India, crocodiles, alligators, or caymen, bask under their rays; and, in the Egyptian land, not only the huge elephant finds repose beneath the umbrageous foliage of acacian groves, but the Hippopotamus takes his bath in the waters of the Nile. This animal is, by some Scriptural commentators, considered as the behemoth of Job, as he eateth grass as an ox. "His bones are as strong pieces of brass; his bones are like bars of iron. He lieth under the shady trees, in the covert of the reed and fens. The shady trees cover him with their shadow; the willows of the brook compass him about." This description, to a large extent, applies to the Hippopotamus. The "leviathan," the largest beast, perhaps, that swims the ocean, is, by modern commentators, put down to signify the crocodile. Those of old considered the "leviathan" as the whale. "In former passages," says the *Pictorial Bible*, "we have seen the ostrich contrasted with the stork; and the eagle mentioned after the hawk; and here, finding the leviathan following behemoth, we may infer a similar connection between them; and might hazard a conjecture, that the Hippopotamus being the behemoth, the leviathan might be the crocodile, an inhabitant of the same river, equally amphibious, and still more terrible. This (opinion) is strengthened when we consider that the two animals were so associated by the ancients. Some of the paintings at Herculaneum represent Egyptian landscapes, in which we see the crocodile lying among the reeds, and the Hippopotamus browsing upon the plants of an island. So also in the famous mosaic pavement at Præneste, representing the plants and animals of Egypt, the river-horse and the crocodile are associated in the same group upon the river Nile."

The Hippopotamus subsists on roots and vegetables, reposing and sleeping on shore in reedy places near the water; and although it is not now found in Egypt, in former times it abounded in the lower regions of the Nile. Its strength is prodigious, and it is nearly of the same size as the rhinoceros, with an enormous head, and a mouth armed with strong tusks. Its disposition, however, is, in general, quiet and inoffensive, until its temper is roused, when its great strength and ferocity render it extremely dangerous, especially in water. The South African species appears to be more timid than that of Dongola; but this distinction may have arisen from an instinctive knowledge of the destructive power of the fire-arms of the colonists. Dr. Smith, speaking of the *Hippopotamus Capensis*, or the sea-cow of the colonists, says, "It was formerly found in most of the large rivers of Southern Africa. It is now almost extinct within the colony, the adventurous hunters having scared away those which escaped death; but great numbers are still found in the rivers of those parts in which the use of fire-arms is wholly or almost unknown. They seem to prefer the sea to the fresh-water rivers for their abode during the day, in situations where they have the choice. They feed on grass, and chiefly during the night; retiring at daybreak to the water, where they remain until dusk again invites them forth to graze."

Thus it appears that it is their natural timidity which forces upon them this mode of life, although their enormous strength might suggest the improbability of their ever being assailed by fear. In this opinion we are confirmed by the following:—"Unless when their own safety or that of their young is threatened, the Hippopotami are so timid, that they betake themselves to the water at the mere approach of mankind; but if attacked and wounded in the water, they often swim to the hunter's boat, rise suddenly beneath it, and seriously damage, if not destroy, it."

The flesh of the Hippopotamus is highly esteemed as food among both the native Africans and the colonists; and the epicures of Cape Town do not consider it as derogatory to their dignity to use their influence with the country farmers, to obtain a preference in being served with *Sea-cow's speck*, which is the name given to the salted and dried fat which lies immediately below the skin. The animal is usually captured by means of pitfalls made along the banks of the rivers; and in order that nothing that is withered or decayed may excite its suspicion, they are daily covered with fresh grass. This artifice has sometimes a different effect from its intent, as it deceives the horses and oxen of travellers, when a very different sort of capture takes place from that of Hippopotami.

Reubens depicted on the canvas an imaginary scene of a combat between a Hippopotamus and an alligator—behemoth and leviathan—on the banks of the Nile, and introduced several men intended to represent the character of hunters, but who appear rather to be warriors than such as would chase the wild beast in an Egyptian wilderness. The alligator occupies the foreground, and his open-mouthed opponent is struggling over it, in an attitude sufficiently imposing to convey a terrible idea of its power. Two of the men have been overthrown; whilst three others, on horseback, are piercing and cutting at the Hippopotamus with spear, javelin, and sword. A couple of dogs, also, appear upon the scene, the one biting the tail of the alligator, and the other flying at the Hippopotamus. The picture is full of incongruities; but there is much spirit in the figures.

We learn from Mr. Salt, that in the district of Abyssinia, watered by the Tacazze, a tributary of the Nile, Hippopotami are very numerous. The Abyssinians term the animal Gomari. As Mr. Salt travelled along the line of the river, he found the stream impeded by rocks, which made a succession of cascades. There were, here and there, shallows; but among these, occasionally, were to be found pools of great depth. It is to these pools that the Hippopotami delight to resort; and here Mr. Salt and his party observed their actions, which he compared to those of a grampus in the ocean.

"It appears," observes the same traveller, "from what we have witnessed, that the Hippopotamus cannot remain more than five or six minutes at a time under water, being obliged to come up to the surface, at some such interval, for the purpose of respiration."

Another writer observes, that it has generally been asserted, that this large, strong, and apparently inoffensive creature has no living enemy bold enough to contend with it. Some travellers, however, have attributed this boldness to the crocodile, describing combats between them, which, in reality, never have had an existence. Even in the wildest state of nature, there is no enmity between these two species of animals. While Mr. Salt and his party were engaged in shooting at Hippopotami, they frequently observed several crocodiles, of immense size, rise to the surface of the stream, seemingly regardless of, and at the same time disregarded by, their still more enormous neighbours. The fact is, that these animals rather meet in friendship than in enmity—hence the incongruities in the picture by Reubens.

Racoon.

THE RACOON.

The Racoon belongs to the Plantigrade section of the carnivora, and is a native of America, where it has a wide range both in the north and south divisions of that immense continent. It possesses a very cunning and inquisitive physiognomy, having large eyes with circular pupils; and, with the exception of the ears, looking very like a fox. None of its senses are so well developed as the one of smell, which is extremely acute; and though the pupil of the eye is round, it is better adapted for twilight than for the glare of day. In its natural state, the habits of the Racoon are nocturnal; and it is, in all probability, from this circumstance, and from the eyes being incapable of sustaining the strength of the sun's light, that blindness from cataract (the opacity of the lens) is, in its species, so frequent when kept in a state of captivity. In speaking of the localities to which the Racoon is driven or attracted by its wants, Buffon says, "This animal is originally from the southern regions of America. It is not found in the old world; at least, travellers who have spoken of the animals of Africa and the East Indies, make no mention of it. It is, on the contrary, very common in the warm climates of America, and especially in Jamaica, where it inhabits the mountains, whence it descends to feed upon the sugar-canes. *It is not found in Canada*, nor in the other northern portions of this continent; nevertheless, it does not greatly fear the cold. M. Klein brought up one at Dantzic; and that which we had has passed a whole night with its feet locked up in the ice, without experiencing any ill effects,"

In so far as the Racoon's not being an inhabitant of Canada, Buffon is, from deficient information, in error, as even its flesh is eaten in that region. Dr. Richardson tells us that "the Racoon inhabits the southern parts of the fur districts, being found as far north as Red River, in latitude 50°, from which quarter about 100 skins are procured by the Hudson's Bay Company. If there is no mistake as to the identity of this species, the Racoon extends further north on the shores of the Pacific, than it does on the eastern side of the Rocky Mountains. Dixon and Portlock obtained cloaks of Racoon skins from the natives of Cook's River, in latitude 60°; and skins, supposed to be those of the Racoon, were also seen at Nootka Sound by Captain Cook. Lewis and Clarke expressly state, that the Racoon at the mouth of the Columbia is the same with the animal so common in the United States." To this Dr. Richardson adds, "Its flesh, when fed on vegetables, is reported to be good."

In a state of nature, we have said that night is the time for the Racoon to be awake, and to be on the alert for its prey. It is said that it kills birds like the polecat, first biting off the head, and then sucking the blood completely out of the body. Roots, succulent vegetables, worms, insects, birds and their eggs, are the principal articles upon which it feeds; although it is very fond of oysters. Fancy a five-clawed Racoon sitting on its haunches, opening oysters, and scraping them out as clean as the most practical fish-dealer can with a knife! For the sake of obtaining this dainty, it frequents the borders of the sea, preferring them even to woods, where its food is much more certain and abundant. A writer, who had a tame Racoon, says that he himself tested the truth of the assertion that it had a great partiality for shell-fish, and found it realised. In opening the oyster, its first operation is to crush the hinge of the shell between its teeth, and then to wrench the two valves so far asunder as to enable it to scrape out the mollusk with its claws. Here is intelligence suggested, no doubt, by instinctive desire. In a description of a tame Racoon, by M. Blanquart des Salines, we are informed that it opens oysters with wonderful skill; it being capable of breaking the hinge, when its paws complete the work. He supposes it to have an excellent sense of touch, as in opening the oyster it rarely avails itself of sight or smell, but passes the oyster under its hind paws, and then, without optical examination, feels with its hands for the weakest place. This discovered, it sets its claws to work, forces apart the valves, and tears out the fish in fragments, leaving "not a wreck behind."

In walking, the movement of the Racoon is oblique, making progress by a series of bounds rather than steps, something like those of the lemurs, but wholly wanting their graceful elasticity. When taken young, it is easily tamed, becoming playful and attached, if fondled and caressed. Its temper, however, would seem to be capricious, as it is easily offended. To some persons it will never show attachment, but, from the very first, a determined hostility; and, if once injured, it has the ungenerous quality in all *weak* natures—in those of man as well as others—NEVER TO FORGIVE. M. Blanquart des Salines states, that a servant had one day struck his Racoon a few blows with a whip. "In vain did the man afterwards attempt a reconciliation; neither eggs, nor food most coveted by the animal, availed in pacifying it. At his approach it enters into a sort of fury. With sparkling eyes it darts at him, and utters loud cries of suffering. Whatever is presented to it at that time, it refuses until its enemy has disappeared. Its accents of anger are very singular. Sometimes one might fancy them the whistling of the curlew; at others, the hoarse bark of an old dog. If any one beats it, or if it be attacked by an animal which it thinks stronger than itself, it opposes no resistance; like a hedgehog, it conceals its head and its paws, and forms its body into a ball. No cry escapes it; and in this position it would suffer death." It appears that this animal was rendered insolent by liberty. It would take possession of a room, and would suffer no one to go near it; nor could easily be ejected from it, or fettered again. All kinds of food are acceptable to it, and it has a great tendency to obesity, which adds to the rotundity of its contour.

Though incapable of grasping objects with its paws, the Racoon can hold its food between them pressed together; in doing which it usually sits upon its haunches, like a bear; and in this attitude it very often feeds. Azara, indeed, informs us that its Paraguay name, Agouarapope, alludes to the inflexibility of its paws, meaning, "The fox with the stretched hand." "In fact," he adds, "the fore-foot of this animal is very open, and has the toes much separated, so that they cannot be made to grasp, having a much greater depth than breadth; nevertheless, it makes use of its two fore-feet, but simultaneously, and without folding the toes, when it wishes to carry food to its mouth." In size it is somewhat longer than a badger; its fur is of two kinds—a soft full under-coat, and an upper nest of long and rather coarse hairs. The general colour is dusky grey, the tint arising from each long hair being annulated with white, and tipped with black. The face, cheeks, and throat are white, with an oblique dash across the face, and surrounding the eyes. Its length is about two feet, of which the tail is eight or nine inches. It climbs trees with the greatest skill, in the same manner as a bear, ascending and descending a pole or stout branches, fastened in its apartment, with the utmost freedom. A great portion of the day, particularly the morning, is passed in sleep; but not always so, for it is often full of animation all the day, even to restlessness. It is not, however, in captivity that a judgment can be formed of the natural habits of animals. There is, in such a condition, no room for their exercise; their instincts have no stimulus to call them forth; monotony oppresses their physical and mental nature, and leads to habits never acquired in a state of wild independence.

Polar Bear.

BEARS.

Bear is the English name for a family of Plantigrades, both mammiferous and carnivorous, and walking on the entire sole of the foot. Although described as flesh-feeding, they rarely eat flesh, unless severely pressed by hunger. They are very fond of fruit and honey—a circumstance which did not escape the observation of Aristotle, who thus describes some of the peculiarities of this family :—"The Bear is an omnivorous animal, and, by the suppleness of its body, climbs trees and eats fruit, and also legumes. It likewise devours honey, having first broken up the hives; crabs, too, and ants it eats, and also preys upon flesh." After this, he tells us that the animal has courage enough to attack the stag, the boar, and even the bull. The Ranger, in the *Tour on the Prairies*, makes some remarks on the honey-seeking qualities of the Bear, in language not quite so classical as it is nomadic :—"The Bear is the knowingest varmint for finding out a bee-tree in the world. They'll gnaw, for a day together, at the trunk, till they make a hole big enough to let in their paws, and then they'll haul out honey, bees and all."

The Polar Bear is one of the species; but his habitation is not among groves and prairies, where both fruits and honey may be brought within the reach of his grasp, but within the Arctic Circle—in those cold polar regions, where he swims amongst broken and detached pieces of ice, and wanders over fields of snow. Martens was among the first to give the characteristics of this species from actual observation. Apparently, the only species known to Linnæus was the Brown Bear; and it was not until the appearance of the tenth edition of his work, that there was any indication given of the Polar Bear being a distinct species. To Martens, therefore, the chief merit belongs of first distinguishing its features, the accuracy of which subsequent naturalists have confirmed.

Inhabiting those dreary and inhospitable regions which encompass the North Pole with long-continued and intense frost, as well as those shores which are seldom free from ice, this animal must feed upon such materials as he can get; and these, therefore, are almost entirely of the animal kind. Beasts of the land, and fish of the sea, birds and their eggs, the dead and the living, are alike acceptable to him, and speedily devoured. Being as often in the water as out of it, he is both an expert swimmer and bold diver; whilst his great strength enables him to attack the walrus, and chase the seal with success. Of his dexterity in the sea, we have heard many anecdotes; and Cartwright relates that he saw one dive after a salmon, which it captured. Captain Lyon has seen it hunting a seal. "The Bear," he says, "on seeing his intended prey, gets quietly into the water, and swims until to leeward of him, from whence, by frequent short dives, he silently makes his approaches, and so arranges his distance, that at the last dive, he comes to the spot where the seal is lying. If the poor animal attempts to escape by rolling into the water, he falls into the Bear's clutches. If, on the contrary, he lies still, his destroyer makes a powerful spring, kills him on the ice, and devours him at leisure." The same writer affirms, that the Polar Bear not only swims with rapidity, but is capable of making long springs through the aqueous element. Captain Sabine states that he saw one about midway between the north and south shores of Barrow's Straits, which are forty miles apart, though there was no ice in sight to which he could resort for rest. When unable to supply himself with the carcasses of whales, and other kinds of animal food, he takes to the coast in search of roots and berries; but he must be hard pressed indeed when he is forced to have recourse to such slender and unsatisfactory provender.

It is stated by Pennant, that Polar Bears are abundant on all the Asiatic coast of the Frozen Ocean, from the mouth of the Obi, eastward, and that they are plentiful in Nova Zembla, Cherry Island, Spitzbergen, Greenland, Labrador, and the coasts of Baffin's and Hudson's Bays; but that they are not found on the shores of the White Sea. Sir Edward Parry saw them within Barrow's Straits, as far as Neville Island; and during his daring boat voyage beyond 82° north latitude. Dr. Richardson says that the limit of their incursions towards the south at Hudson's Bay, and on the coast of Labrador, is about the 55th parallel. Sir John Franklin was informed, by the Esquimaux to the westward of Mackenzie River, that they occasionally, though rarely, visited that coast. Captain Beechy did not fall-in with any on his visit to Icy Cape.

As the abode of the Polar Bear is taken up chiefly on fields of ice, he is frequently carried far from the land, perhaps entirely unknown to himself; and "in this way," says Dr. Richardson, "Bears are often carried from the coast of Greenland to Iceland, where they commit such ravages on the flocks, that the inhabitants rise in a body to destroy them." The same writer adduces the following from the manuscripts of Mr. Andrew Graham:—"In winter the White Bear sleeps like other species of the genus, but takes up its residence in a different situation, generally under the declivities of rocks, or at the foot of a bank where the snow drifts over it to a great depth: a small hole for the admission of fresh air is constantly observed in the dome of its den. This, however, has regard solely to the she-bear, which retires to her winter quarters in November, where she lives without food, brings forth two young about Christmas, and leaves the den in the month of March, when the cubs are as large as a shepherd's dog. If, perchance, her offspring are tired, they ascend the back of the dam, where they ride secure either in water or ashore. Though they sometimes go nearly thirty miles from the sea in winter, they always come down to the shores in the spring with their cubs, where they subsist on seals and seaweed. The he-bear wanders about the marshes and adjacent parts until November, and then goes out to the sea upon the ice, and preys upon seals. They are very fat; and though inoffensive, they are fierce when provoked."

Captain Lyon obtained, from an intelligent Esquimaux, the following account of the habits of this Arctic animal. At the commencement of winter, the pregnant she-bears are very fat, and always solitary. When a heavy fall of snow sets in, they seek some hollow places in which they can lie down, and remain quiet until they are covered by the falling snow. They then go to sleep, and do not awake until the spring sun is pretty high, when they bring forth their young. "The cave (in which the she-bear is now concealed) has by this time become much larger, by the effect of the animal's warmth and breath, so that the cubs have room enough to move, and they acquire considerable strength by continually sucking. The dam, at length, becomes so thin and weak, that it is with great difficulty she extricates herself when the sun is powerful enough to throw a strong glare through the snow which roofs the den. * * * The natives find and kill the Bears during their hibernation, by means of dogs, which scent them through the snow, and begin scratching and howling very eagerly. As it would be unsafe to make a large opening, a long trench is cut of sufficient width to enable a man to look down and see where the Bear's head lies, and he then selects a mortal part, into which he thrusts his spear. The old one being killed, the hole is broken open, and the cubs may be taken out by hand, as, having tasted no blood, and never having been at liberty, they are then harmless and quiet. Females which are not pregnant, roam, throughout the whole winter, in the same manner as the males."

Ibbetson, del.

Arabian Camel

> Bore then upon its massive board
> No mark to part the squire and lord.
> Then was brought in the lusty brawn
> By old blue-coated serving-man;
> Then the grim Boar's head frowned on high,
> Crested with bays and rosemary.
> Well can the green-garbed ranger tell,
> How, when, and where the monster fell;
> What dogs before his death he tore,
> And all the baiting of the boar;
> While round the merry wassail-bowl,
> Garnished with ribbons blithe did trowl."

Such, in days of yore, was Christmas-time in England, when the Wild Boar tenanted her woods; but it is long since he was there exterminated, although he still holds his place among the *fauna* of other countries.

The common Wild Boar, which is considered to be the original of the domestic hog in all its varieties, is found generally in the temperate regions of Europe, Asia, and some parts of Northern Africa. But the Wild Boar of Southern and Central Africa, commonly called the Engallo, differs from the common Wild Boar in several important respects. The Engallo is described as the most hideous of all mammals in appearance. It bears a resemblance to the elephant in the form and structure of its molar teeth. Of these there are never more than two in each jaw; they are not renewed, as in ordinary quadrupeds, by the new one growing under the old, and gradually pushing it out of the socket; but the young tooth is formed, in this case, behind the old one, and gradually advances forward, and assumes its situation as the latter is worn down by constant use. We believe that naturalists are still in doubt as to the identity of one or two species of the Wild Boar; but there is no doubt respecting the Masked Boar of the Cape, which is thus described in Mr. Smith's edition of Cuvier:—

"The Masked Boar is a native of the Cape, nearly the size of the European Boar, and has all its proportions. The only distinction is in the fleshy protuberances. From the head to the eyes it is of the usual figure; but from under the eyes commences this protuberance, which gradually diminishes towards the snout. Thus there appear to be two heads; the half of the one being, as it were, enclosed in the other. The peculiar characters of the skull correspond with this facial mask." In the South African Museum there was wont to be a specimen, which is thus described:—

Phascochœrus Africanus—the *Vlacke Vark* of the Cape colonists—when disturbed in its retreat, and more especially when hunted, is a very dangerous animal; for though it will not turn out of its way to give chase, it will, if brought to bay, or directly encountered during its flight, use its formidable tusks with great ferocity; and it has been known to cut, with one stroke, completely through the fleshy part of a man's thigh. In the frontier districts of the colony, where some few are still to be found, they rarely venture to seek their food during the day; but in the countries inhabited by natives, who are destitute of the efficient arms of the colonists, they are at all times to be met, though their favourite feeding-times are early in the morning and late in the evening, or even during the night—especially in moonlight.

The flesh of the Wild Pig is used as food by the colonists, the Hottentots, and the Bechuanas; but not by the Coast Caffres, who are much more particular as to what they eat than any of the other natives of South Africa, and regard, as an inferior class, all persons who consume as food the articles they reject.

The name of Hog, or Pig, has sometimes been given to animals which differ essentially. Thus the Europeans have called the Cavey the Water-Hog. The animal improperly called a Guinea-pig, in England, and *Cochon d'Inde*, in France, is known to be one of the *Glires*, or *Rodentia*. The Tatous are called Hogs in Armour by the Spaniards. The Dutch of the Cape call the Porcupine the Iron Hog. The Porpoise has been called the Sea-Hog; and the same name has been given, by Molina, to a species of the Phoca.

The genus *Sus* may be considered as including—after the animal commonly known as the Hog, or Swine—the Alpine Hog, the Baly-roussa, and the Peccary.

THE ARABIAN CAMEL.

In the wild and pathless regions of the Arabian desert, without settled abodes, or any of those comforts which the nations of Western Europe usually consider as necessary to the enjoyment of life, dwell, or rather wander, the descendants of Ishmael. For upwards of 3,700 years they have been the sole inhabitants of that dreary solitude in which Ishmael pitched his tent; and have, throughout that long period, exhibited the striking characteristics which marked the disposition of their ancestor, of whom, before his birth, it was declared that "He will be a wild man; his hand will be against every man, and every man's hand against him." The wandering Bedouins have never bent their neck to the power of a foreign conqueror. Sesostris, Cyrus, Pompey, Trajan, and other "princes and potentates," have endeavoured to conquer them; but in the very hopelessness of success they have been compelled to abandon the enterprise. They have gained some triumphs over detached tribes; but even these conquests were of short duration. The reason of this is obvious. The very nature of the country is a guarantee for the freedom of its inhabitants. Surrounded on three sides by the sea, and being for the greater part utterly destitute of the most common necessaries of life, no army could subsist in it long enough to subdue it. Hence the reason of its freedom, and the peculiarities of its people.

There are two animals in the possession of which the Arab especially prides himself—the Horse and the Camel. The first is his greatest favourite; the second his greatest necessity. Without the Camel he could not traverse the trackless ocean of sand in which it is his destiny to live. In the legends of the East, this patient creature is called the "Ship of the Desert." It is, however, not only the carrier and the medium for preserving intercourse with different countries, but is also, as is shown by Carl Ritter, "the main requirement of a nomadic mode of life in the patriarchal stage of national development in the torrid regions of our planet, where rain is either wholly or in a great degree absent." No animal's life is so closely associated by natural bonds with a certain primitive stage of the development of the life of man, as that of the Camel among the Bedouin tribes; nor has any other been established, in like manner, by a continuous historical evidence of several thousand years. In a note to Humboldt's *Views of Nature*, we find it stated that "the Camel was entirely unknown to the cultivated people of Carthage, through all the centuries of their flourishing existence, until the destruction of the city. It was first brought into use for armies by the Marusians in Western Lybia, in the times of the Cæsars; perhaps in consequence of its employment in commercial undertakings by the Ptolemies, in the valley of the Nile. The Guanchas, inhabiting the Canary Islands, who were, probably, related to the Berber race, were not acquainted with the Camel before the fifteenth century, when it was introduced by Norman conquerors and settlers. In the probably very limited communication of the Guanchas with the coast of Africa, the smallness of their boats must, necessarily, have impeded the transport of large animals. The true Berber race, which was diffused throughout the interior of Northern Africa, and to which the Tibbos and Tüaryks belong, is probably indebted to the use of the Camel throughout the Lybian desert and its oases, not only for the advantages of internal communication, but also for its escape from complete annihilation, and for the maintenance of its national existence to the present day. The fresh leaves of the acacia are equally enjoyed; and the Bedouins spread their mats under this tree, and beat its boughs to bring down the leaves for the food of their desert "ships." *Deloul* is the name applied to those Camels which are trained for the saddle, and which are generally very docile, and travel at an easy pleasant pace. The Arab never sets out on a long journey without examining the hump of his animal. If this be large, he is assured of its capability of bearing hunger and fatigue; but if small, he knows that the animal will soon sink under its load. A long journey will cause this hump almost entirely to disappear; but rest and nourishment will soon reproduce it. How singular even is this provision of nature!

In Arabia, Syria, Nubia, Persia, Asia Minor, North Africa, and other portions of Oriental countries, where the routes from one city or place to another are infested with wandering troops of robbers, and where long, dreary, and desolate tracts of sterile soil are to be traversed; where the desert is "like a sea without waters, an earth without solidity, disdaining to hold a foot-print as a testimony of subjection," travellers are in the habit of uniting in large numbers, in the expectation of being likely to accomplish their journey with greater safety and convenience. A travelling company of merchants or pilgrims (for commerce or devotion, or both, may be the object of their journey) is denominated a caravan—a derivative of the Persian word *Cárwân*. It is hardly necessary to state that the Camel, the "Ship of the Desert," is the only animal capable of enduring the hardships of a journey across the arid and sandy plains, and at the same time to carry on its back a considerable burden. Horses do accompany the caravans; but unless the patient Camel bore skins filled with water for their use, they would perish of thirst. This animal is capable of subsisting, for a period of ten days together, without water; and it is no uncommon circumstance for it to travel three or four days without any of that liquid entering within its lips. Thus has Providence adapted it to the sterile, inhospitable, and waterless region in which it is found to be indispensable to the purposes of man.

Crested, and Brazilian Porcupine.

THE CRESTED AND BRAZILIAN PORCUPINE.

THE general appearance of the Crested Porcupine, when compared with its habits, should teach us not to draw too hasty conclusions from external appearances. Formidable as it seems to be, from the weapons with which it is armed by nature, it is, notwithstanding, perfectly harmless and inoffensive. It must be allowed, indeed, that it appears highly irascible, which has induced Shakspeare to call it the "fretful porcupine;" but that apparent irascibility probably arises partly from fear, and partly from the great redundancy of bile in its constitution. Its sharp quills, with which it so often threatens an adversary, are never used but for its own preservation. Inoffensive in its nature, it is never the aggressor; but when roused to a necessity of self-defence, it is said that even the lion dare not attack it.

When the Porcupine is hunted or pursued by any other animal, it never attempts to bite or defend itself, but climbs up the first tree it can reach, where it remains till the patience of its adversary is exhausted. If it cannot reach a tree, and is hard pressed, it lies down on one side, and presents its quills to its enemy, in which situation it finds perfect security. Sir Ashton Lever, a gentleman who lived about the beginning of the present century, kept a live Porcupine, which he frequently turned out on the grass behind the house, to play with a tame hunting leopard and a large Newfoundland dog. As soon as they were let loose, the leopard and the dog began to pursue the Porcupine, which at first endeavoured to escape by flight; but finding that ineffectual, it thrust its nose into some corner, making a snorting noise, and erecting its spines, with which its pursuers pricked their noses, till they quarrelled between themselves, and gave it an opportunity to make its escape.

The Indians use the quills of the Porcupine to adorn the many curious articles they make, the neatness and elegance of which would not discredit more enlightened artists. For this purpose they dye them of various beautiful colours, and split them into slips, with which they embroider their baskets, belts, and other things.

This animal inhabits India, Persia, Palestine, and all parts of Africa. It is also found wild in Italy, though not originally a native of any part of Europe. It sleeps during the day, and feeds only by night. Its appetite is keen, and its manner of feeding voracious, although it can support hunger for a considerable time without any apparent inconvenience. The female goes with young seven months, and produces only one at a time, which she suckles about a month. During this period she is very resolute in defence of her offspring.

The Brazilian is not so large as the Crested Porcupine. Its quills are likewise much shorter, being not more than three inches long: they are white, barred with black near their points, and are exceedingly sharp. Its nose is short and blunt, adorned with white whiskers, and furnished underneath with a small bed of spines. It has four toes, armed with very long claws on each foot; and in the place of the thumb there is a great protuberance. The tail is eighteen inches in length. That half of it which is next to the body is covered with sharp spines, the other half being naked, excepting only a few hairs; the end is strongly prehensile.

This Porcupine is a native of Mexico and Brazil, where it lives in the woods, and feeds indifferently on fruits and poultry. Like its congener, it sleeps by day, and searches for its food by night. Its voice has a striking resemblance to the grunting of a hog, and it makes a noise with its nostrils, as if it were short of breath. It climbs trees with great agility, and prevents itself from falling, as it descends, by twisting its tail round the branches. The flesh of this species is in general fat, and well-flavoured.

The whole of this family is remarkably characterised by a covering of spines, which, like those of the hedgehog, are, relative to their structure, merely a species of thick and strong hair. They are all plantigrade; and their general aspect is heavy and hog-like; whilst their resemblance to the porcine races may be considered to be increased by their terrestrial occupation being usually accompanied by a series of grunts, such as all of us have heard uttered by the brood sow when on its march to some neighbouring manure heap. The muzzle is broad and flat; the ears short and rounded; and it has four incisors, two above and two below, which are smooth and large; whilst it has eight molars above, and the same number below. The name is derived from the French *porc*, signifying a hog, and *epin*, a spine.

The Common Porcupine is a native of Southern Europe, of most parts of Africa, and many parts of Asia; and it is one of the largest rodents, having a length of from two to three feet, besides the tail, which is about six inches long. The hinder parts of the head and the neck are furnished with a crest of long bristles, capable of being raised or depressed at the will of the animal; whilst the muzzle and limbs are protected from the inclemencies of the atmosphere by a covering of very short hair. The back and sides are armed with spines, longest in the middle of the back, where they are nearly of the thickness of a goose-quill, and beyond a foot in length. These spines are supported by a slender pedicle, and they terminate in a sharp point. In the direction of their longitude they are striated, besides being ringed with black and white, which has the effect of imparting a grey colour to the animal's whole appearance. They usually lie flat, with the points directed backwards; but when the creature is roused and becomes excited, it erects them, rolling itself up like the hedgehog, and presenting its pointed spears in every direction. Then it has really a formidable appearance, as if threatening its assailant with danger or destruction. The structure of the tail-spines, or quills, is exceedingly singular, being open, thin-sided tubes, about a couple of inches long, sustained by slender flexible pedicles. It is said that the Porcupine rattles the spines of its body when irritated; but this appears to be doubtful. "The statement," says a modern writer, "has been often made, that it throws off its spines, or quills, by a voluntary act, launching them at its adversaries; but it has no such power; although it is possible that quills ready to come off may be detached in moments of excitement, and fly to a small distance with sufficient force to be annoying to a pursuer. The Porcupine's armour, however, is strictly defensive, and it seeks to turn its back, and thus the points of its spines, to an enemy. It is a solitary and nocturnal animal, burrowing in the ground, and in winter becoming torpid. It feeds on the bark of trees, roots, fruits, and other vegetable substances; and if it has a chance, not unfrequently perpetrates great depredations upon the most tempting things to its appetite in the garden. Its spines are used for various purposes, and possess a certain commercial value. It is on their account that it is principally sought; although its flesh is eaten, and, in ancient days, might have been seen in the markets of Rome."

A larger species of Porcupine, with the quills and tail quite white, is found in India; and other species inhabit various parts of the East. The Canadian animal (Urson) is different from the true Porcupines; whilst the Coendus of the warm parts of America are remarkably distinguished by their long prehensile tails. These animals are covered with short quills, and, like the Urson, live among the branches of trees.

Harneſsed Antelope.

THE HARNESSED ANTELOPE.

THE colour of this swift and beautiful animal is that of a bright fulvous bay, which prevails in the body, and is marked by longitudinal and transverse lines of white, which divide the ground-colour into patches, bearing a striking resemblance to those of the giraffe or camelopard. The male is nearly of the size of the fallow deer, having black horns, with a length of about seven inches. This animal appears to have been first noticed by Mr. Adamson, in Senegal, in the country of Podor, about sixty leagues inland from the sea. Lichtenstein says that it is an inhabitant of Caffraria; but Mr. Burchell did not fall-in with it there; and we believe, as far as is yet known, it is either very rare, or inhabits only those districts in the interior which have hitherto been scarcely penetrated by European explorers.

In every part of Asia and Africa species and varieties of the Antelope are found; but the similarity in their habits and manners causes a corresponding one in the modes of their capture, so that a detailed description of the way in which they are all taken, is rendered unnecessary. The chetah and the hawk are often employed to capture them in India, China, and Tartary, by the native nobility and princes; while the Arabian wanderer in the desert, the Caffre of Southern Africa, and the European settler of the Cape, employ, according to their different means and habits, those inventions which they find most certain to elude the vigilance, or to render abortive the speed, of their prey. The chamois, being the only species found in Western Europe, is well known both to the hunters of the Alps and of Switzerland; and to them the hunting of this animal becomes a passion so strong, that it seems altogether incapable of repression. Although the chamois-hunter is aware that not one in ten of those who follow the perilous sport ever dies a natural death, and that the pecuniary remuneration for the skin, and the supply of food from the carcass, are so small, that almost any other occupation would be a great deal more lucrative, still it is a sport so healthy and exciting, that it is scarcely ever the case that a hunter gives up his profession. He pursues it till accident or age incapacitates him for its enjoyment, and seeks its excitement with an intensity equal to that which the drunkard seeks the beverage that kills, or the gamester the cards that ruin.

There is another species of Antelope which inhabits Europe, although not in its western portion. This is the Saiga, which roams the plains of the Danube, and is found in Poland, Moldavia, and the corresponding parallels of latitude, nearly to the confines of Thibet. The horns, which are semi-transparent, and of a light-yellow colour, serve the Russians and the Chinese as a substitute for glass in lanterns; whilst the skins are made into gloves. The Carpathian mountains, their offshoots, and the valleys between them, are the haunts of the wild deer, and are, in many instances, extremely beautiful and picturesque. The loftier portions of the mountains attain an average height of 5,000 and 6,000 feet; and it must be one of the finest sights in the world to a hunter to see the graceful Antelope standing on the edge of some of their giddy cliffs, watching his approach. The group of Tatra, under the 20th meridian, contains ten peaks, which exceed 8,000 feet; the highest is 8,524 feet. Peaks of still greater height are said to occur in the more southern parts of the system, on the confines of Transylvania. The Carpathians are steepest on their outward side; that is, towards Wallachia, Moldavia, and Galicia. In this quarter they are, in general, extremely rugged, and the passes through them narrow and difficult. The valleys are numerous, and, to the lover of nature, beautiful; whilst the wild glens in the group of Tatra are interspersed with mirrors of water, filled by sounding cascades.

In Africa the species of the Antelope may be considered as somewhat numerous, a few of the principal of which we will here briefly describe. One of these is the Canna, which is the giant of the whole tribe, weighing, when full-grown, from seven to nine hundredweight, and equalling a small horse in size. Unlike some other species, it is a corpulent, heavy animal, and its flesh is held in higher estimation than that of any other of the African species. Near the Cape it has been so much hunted, that it is now scarce; but when it does make its appearance in the neighbourhood, the hunters endeavour to chase it towards their own homes, and will not kill it until they have hunted it near to these, to save them the fatigue of carrying so heavy a carcass from a distance which might exhaust their power of muscular endurance.

The Pallah is another kind of Antelope hunted for its flesh, especially by the Caffres near Lakatoo, where they are said to be plentiful. Its flesh, though lean, has an excellent flavour, and is nutritious. The Steen-bok, Grys-bok, and Klispringer, are all hunted for the venison they supply. The Spring-bok has the remarkable peculiarity of jumping up perpendicularly for a considerable height from the ground, without any apparent motive. It holds its habitat among the arid plains of Southern Africa; and when forced by necessity to migrate in search of pastures new, and fresh water, during seasons of particular drought, they assemble in troops of from ten to fifty thousand, and proceed on their march like an army of soldiers. The whole of their route presents an appalling scene of devastation. Every green thing has been either devoured or trampled under foot; and if endeavoured to be impeded in their progress by bands of men with dogs, brought together with that view, it is with the greatest difficulty that they can be turned aside from the direction which, in their *map* of instincts, they have intuitively marked out for themselves. We have heard it averred that the lion has been seen walking along with, and in the very midst of this compact army, receiving only as much room as he could procure by the terror of his nearest victims causing them to spread themselves away from him, in an outward direction, as far as the immense crowd, of which they formed a part, would allow them. There appears to the imagination something bold and majestic in a scene of this kind, in which one individual is sufficient to appal such a multitude.

The Lakhaitze is another species which inhabit Lakatoo, and is so fierce that the bushmen dare not attack it, but capture it by means of pitfalls, concealed by being covered over with sticks and earth. It, however, cannot be considered as belonging to the perfect Antelope type, but as holding a place between it and the genus Buffalo. The native hunters in some parts of the East, and the Moors of Barbary, chase the Antelopes on horseback; and when they come up with them, bring them down by fracturing their legs with heavy pieces of wood, which they throw at them; but this seems a cruel sort of sport, and is certainly not so effective in destroying the animals as the plan adopted by the Caffres. These assemble in considerable numbers, sometimes consisting of several hundreds, who form a circle so large as to enclose a herd. Each person then makes towards a common centre, gradually contracting the circumference till the Antelopes are crowded into a comparatively small space. An opening for them to escape by is then made in the circle formed by their enemies, and through this the frightened animals rush in tumultuous confusion, when they are brought down by the weapons of the hunters as fast as decaying leaves are swept from the branches of a forest in an autumnal tempest.

Proboscis Monkey, & Long-armed Ape.

PROBOSCIS MONKEY AND LONG-ARMED APE.

AMONG all the animals with which the earth is inhabited, the different races of Apes and Monkeys are the most singular, and have commanded the greatest attention of the naturalist as well as the comparative anatomist. From their retired habits in a wild state, and from the success with which they elude observation, a considerable degree of difficulty has been found in ascertaining with truth the habits and peculiarities by which they are distinguished. It has, therefore, required much time and great patience to arrive at those conclusions which, respecting them, are now known to naturalists. The largest portion of the information possessed of them has been received from travellers; who, in many instances, could neither have had the time nor the opportunity of thoroughly knowing the species they described, and, therefore, of coming to correct conclusions upon the singularities which belong to the different kinds of this extraordinary race of animals. Superstition has had its own share in darkening the minds of men regarding them. In India and Egypt they seem to have been idolised. "In Ahmenadab hospitals have been erected for the benefit of Apes, where thousands are kept in fancied ease and indulgence; and another city, which was taken by General Goddart in 1780, upon its surrender, contained 40,000 inhabitants, and as many Monkeys. They are even worshipped by the Brahmins, and are raised to the rank of gods. Gorgeous temples are erected—

> 'With pious care, a Monkey to enshrine!'

Moflens, in his *History of India*, describes one of great magnificence. It was fronted by a portico for receiving victims sacrificed to it, which was supported by no less than 700 columns; and Linschotten relates, that when the Portuguese plundered one of these monkey palaces, in the island of Ceylon, they found, in a little gold casket, the tooth of an Ape—a relic held by the natives in such veneration, that they offered 700,000 ducats to redeem it. It was, however, burned by the viceroy, to stop the progress of idolatry. Among the ancient Egyptians they also seem to have been held in more than ordinary reverence; or, at least, to have borne a rank equal to that of the sacred ibis. They were, like them, represented in the sculptures, and their bodies were preserved as mummies."

There is something extremely absurd in idolising an animal like the Long-nosed Monkey represented in our engraving. We do not know whether he was elevated to a niche among the gods of superstition; but, if so, it could not have been on account of his beauty. In the *Naturalist's Library*, edited by Sir W. Jardine, he is thus described:—"This singular Monkey is at once distinguished by the extraordinary elongation of the nose, which is nearly four inches in length, and gives a grotesque appearance to the animal, at the same time, far from pleasing. In other respects it presents a form of considerable interest to the zoologist: the body is unshapely, protruding in front like the orang's, and wants the lightness possessed by so many of the Guenous. The arms are of very considerable proportional length, like the gibbons; and, like the howling Monkeys, it possesses a large guttural sac; while the presence of a lengthened tail, and of naked callosities, present, altogether, a very curious combination."

Audebert, in his *Histoire Naturelle des Singes*, calls it the kahan, suggested by its cry. When placed in an erect position, it is about three feet in height; and, with the exception of the tail, and the lower part of the back, is of a reddish-brown colour. The female is said by Audebert to be without the light-coloured markings on the back, and to be rather less in size. The nose and face are of a blackish-brown colour; the nostrils are at the extremity, and can be blown up or inflated to a considerable size. It is a native of the island of Borneo, and is not abundant in European collections. In its habits it is gregarious, and is said to collect in large troops at sunrise and sunset, upon the trees bordering the rivers. The whole of the species is possessed of great agility, springing from tree to tree, though separated to a distance of from fifteen to twenty feet.

In modern zoology the Monkey family is divided into two great parts, and the title *Quadrumana* given to them on account of their generally possessing thumbs, opposed to the fingers of both the fore and hind limbs. These enable them to seize any object with the greatest firmness, and render them expert climbers. In fact, they are four-handed creatures, with strictly arboraceous habits; and, consequently, mostly inhabiting the interminable forests of the tropics. They are, indeed, rarely found at any long distance from the woods; and the species which seeks its habitat among cliffs and precipices, such as those in the neighbourhood of the Cape of Good Hope, in Barbary, and about the rock of Gibraltar, deviates from the true type, becomes more quadrupedal in its form and actions, and has, therefore, always been placed last in our systems. It is on the precipitous sides of the rock of Gibraltar that the Barbary Ape is more particularly found, although it also appears in Egypt. Frederick Cuvier says that these animals walk most commonly on all-fours, while at the same time they are very active climbers. He confirms the opinion of their being gregarious, filling the forests with their vast troops, and openly attacking those enemies which they think they can overcome, while they drive to a distance, by their numbers and screaming, any intruder of whose powers they are doubtful. In a state of captivity it is capable of more than ordinary powers of comprehension; but to improve those abilities as far as possible, it should be procured young, as with advanced age it generally becomes more sullen and morose, and even, sometimes, dangerous. It is very frequently seen in England, and, next to the green Monkey, has the misfortune to be most commonly selected to accompany strolling bands, and owes most of its torments to the superior intelligence with which it is endowed.

The Long-armed Ape belongs to the species. It is the *Simia Lar* of Linnæus; and was thought to be subject to a variation of the wrists and hands to white; but this distinction has turned out to belong to a different species; and for the one with white hands M. Geoffrey Saint Hilaire has retained the old name of *Lar*, while the totally black species has been dedicated by the same gentleman to Sir Stamford Raffles, under the name of *Hylobates Rafflesii*. "Another animal allied to these, generally described as a variety, under the title of *Lesser Gibbon*, seems to be held as a subject of doubt by our most modern zoologists. It is much less in size, and has generally been procured from Malacca. There is a sixth species, somewhat allied, except in colour, which, by older writers, was also confounded with the Moloch, or Wow-wow—the *Hylobates Lenciscus* of moderns. It inhabits the Moluccas; is entirely of a greyish white, except the face, which is black, but does not differ in general habit from its congeners." It is said that the animals belonging to this species, are, in a state of captivity, characterised by stupidity, dulness, and inactivity, becoming mild in a few days, and losing their ferocity to such an extent as to become timid. They have neither the familiarity nor the impudence which so many of this tribe very soon acquire; nor does either good or bad treatment, apparently, greatly affect their dispositions.

ASSES.

It is said that there is but one species of the horse, but that there are several species of the Ass. The earliest mention made of this domestic animal is in the enumeration of the possessions of Abraham while he was in the Egyptian land, where we find herds of he-asses and she-asses, oxen, camels, and flocks of sheep. From the particular notice of she-asses, it is probable that the patriarchs made use of their milk; but whether this was or was not the case, there is no doubt that the Ass was the ordinary beast of burthen, as well as for riding, in south-eastern Asia before the horse was reduced to these purposes. In the book of Judges, we are told that white Asses were appropriated for the use of those who held offices of authority; and it would appear that the present of an Ass, under certain circumstances, was expected to be made to men of authority, by their inferiors, in all probability as being a sort of delicate way of bribing them in legal decisions. Hence both Moses and Samuel seem to have vindicated their purity and integrity as judges, by affirming that they had accepted of no man's Ass. In this light the present of a horse is still regarded in Turkey in Asia. One of the peculiarities of Bagdad is its race of white Asses, which, as at Cairo, are saddled and bridled for the conveyance of passengers from one part of the town to another, wheeled carriages of any description being there entirely unknown. These are as large and as spirited as the Egyptian Ass, and are endowed with a pace equally easy and speedy. They are frequently spotted all over with colours, and otherwise fantastically *adorned* with red stains of the plant called *Henna.* But whatever may be the estimation in which the Ass is held in these Oriental countries, in England his name has long been used as the synonym for stupidity. He is, there, poor brute! treated with very little consideration; and the work he is made to do, is frequently like the provender he is forced to eat—very hard.

Turning from the tame to the wild animal, the beautiful and graphic description of Job at once rises before the imagination. We behold him searching after every green thing, whilst the range of the mountains is his pasture. "Who hath sent out the wild Ass free? for who hath loosed the bonds of the wild Ass? Whose house I have made the wilderness, and the barren land his dwellings. He scorneth the multitude of the city, neither regardeth he the crying of the driver." The same animal is alluded to by the prophet Jeremiah, and in other Scriptural passages. The singular accurateness of these passages has been fully verified by modern travellers, whose wanderings in the East have brought them into the country of the wild Ass. One of these is by Robert Ker Porter, who informs us that, in his route from Ispahan to Shiraz, he had just entered the province of Fars, when his greyhound suddenly started off in pursuit of an animal, which was stated by the Persians in company, from the furtive glimpse they had of it, to be an antelope. The party immediately struck their spurs into their horses, and, after an unrelaxed gallop of fully three miles, they overtook the dog, then within a short stretch of the creature, which, however, to the surprise and vexation of Sir Robert, he discerned to be only an Ass. "But," to use his own words, "on a moment's reflection, judging from its fleetness it must be a wild one—a species little known in Europe, but which the Persians prize above all others as an object of chase—I determined to approach as near to it as the very swift Arab horse on which I was mounted would carry me. But the single instant of checking my horse to consider, had given our game such a head of us, that notwithstanding all our speed;

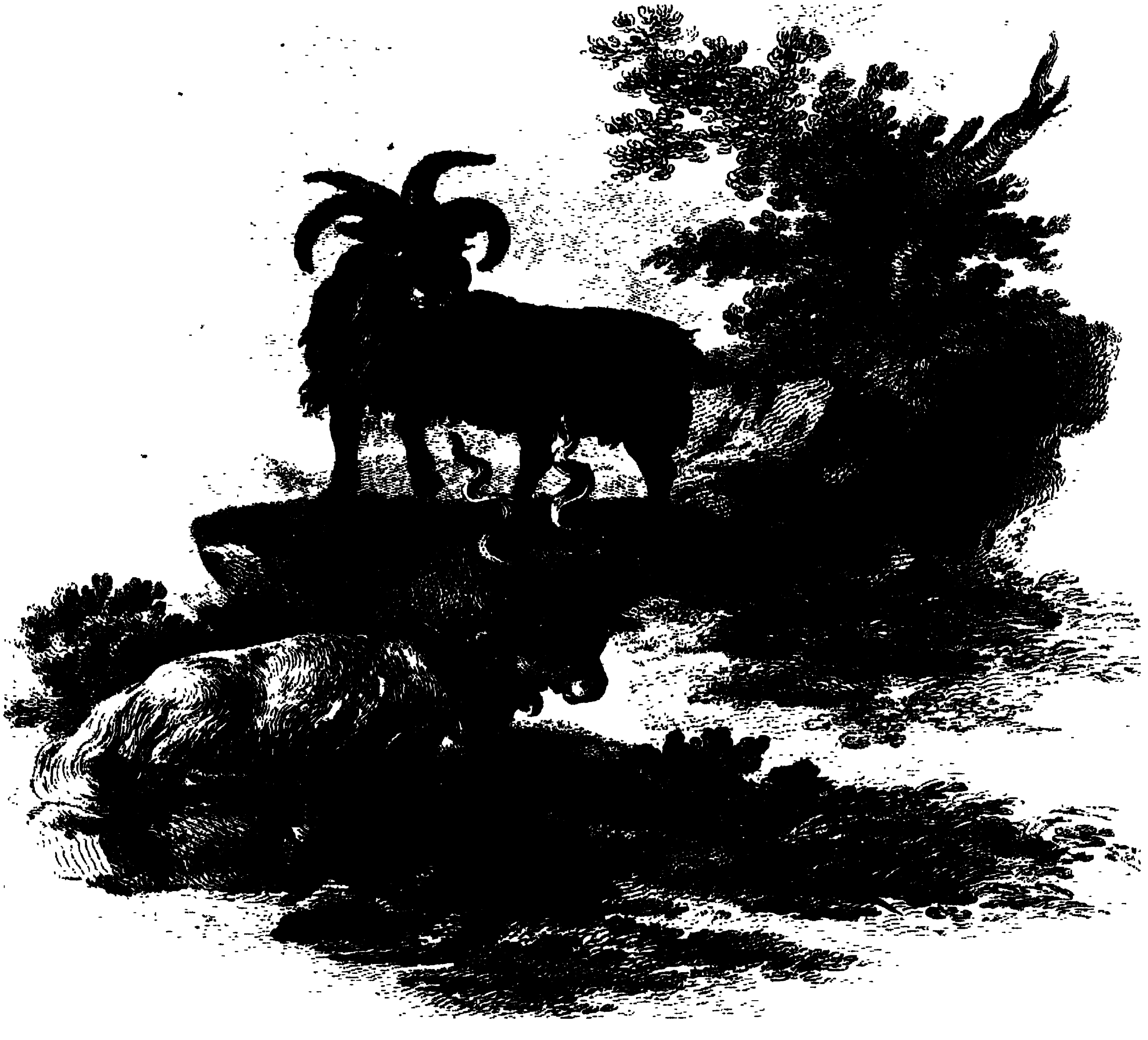
we could not recover our ground on him. I, however, happened to be considerably before my companions, when, at a certain distance, the animal, in its turn, made a pause, and allowed me to approach within pistol-shot. He then darted off again with the quickness of thought, capering, kicking, and sporting in his flight, as if he were not blown in the least, and the chase were his pastime." This was actually realising the language of Scripture—"He scorneth the multitude of the city."

This specimen appeared to Sir Robert to be about ten or twelve hands high, with his skin as smooth as that of a deer, and of a reddish colour, except under the belly and on the hinder parts, which were of a silver grey. His neck was finer than that of the domesticated Ass, being of greater length; whilst it had the beautiful curve of the stag's, and its legs were exceedingly slender. The head and ears appeared large in proportion to the gracefulness of these more elegant parts, by which Sir Robert first discovered that the object of his pursuit was one of the Ass tribe. The mane was short and black; as, also, was the tuft which adorned the end of his tail. No line whatever ran along his back, or crossed his shoulders, such as are characteristic of the tame species. "When my followers of the country came up," Sir Robert continues, "they regretted I had not shot the creature when I was so near to him, telling me his flesh was one of the greatest delicacies in Persia; but it would not have been to eat him that I should have been glad to have had him in my possession. The prodigious swiftness and peculiar manner with which he fled across the plain, exactly coincided with the description that Xenophon gives of the same animal in Arabia."

Sir Robert was informed by the Mehmandar—the officer especially appointed to attend strangers in Persia—who had been in the desert when making a visit to the shrine of Ali, that the wild Asses of Irak Arabi differ in nothing from the one which had just been seen. He had often observed them, for a short time, in the possession of the Arabs, who told him that the species was quite untamable. In Buffon's *System of Natural History*, it is said that wild Asses are to be found in the Archipelago, and in the deserts of Northern Africa; and that they go in troops, are very swift, and of a grey colour, but not of so handsome a figure as the zebra.

Whatever may be the beauty, elegance, and general qualities of the wild Ass, it is, in Britain, usually assumed that it does not enter into the form of the domestic animal. Even the Arab, so partial to the equine species, looks with contempt upon the poor donkey. The author of *Sketches in Russia* was one day conversing with Abdulla Agra, when he was interrupted by the arrival of a medical gentleman who had long resided at Abusheber, and who was not more remarkable for skill in his profession than for a kindness of heart, which led him to devote his time to the poorer inhabitants of the country who sought his aid. He had just been setting the broken leg of an Arab, of whom he gave the following anecdote:—

"The patient," said the doctor, "complained more of the accident which had befallen him than I thought becoming in one of his tribe. This I remarked to him, and his answer was truly amusing. 'Do not think, doctor, I should have uttered one word of complaint if my own high-bred colt, in a playful kick, had broken both my legs; but to have a bone broken by a brute of a jackass is too bad, and I will complain.'"



Many-horned, and Walachian Sheep.

THE MANY-HORNED, AND THE WALLACHIAN SHEEP.

The Many-horned Sheep is usually found in Iceland, Muscovy, and other northern countries. It is, in the form of the body, similar to the English Sheep, but varies materially in the number of its horns—having commonly four, and sometimes eight, branching out from the forehead. Its fleece is of tolerable length, smooth, and of a fibre between hair and wool; and beneath its external coat, which, at certain periods, falls off, is another covering which resembles a fine kind of fur. The quantity produced by each animal weighs about four pounds. Mr. Pennant has described an individual of this species as having two erect and two lateral horns; the fore-part of its neck covered with yellowish hairs, that measured fourteen inches in length; and the other parts of its body covered with wool. He also mentions an elegant species brought from Guinea, which was small of stature, but beautifully limbed. Its hair was of the finest texture, and exhibited a silvery whiteness. That portion which shaded the neck was of considerable length. Its nose was partially marked with a glossy black; each knee and ham was prettily spotted, and the feet were completely black. So evident was the effect of climate upon this animal, that in the month of November it began to assume a soft woolly coat. Its disposition, for some time, was extremely gentle; but it afterwards contracted such vicious habits, that its owner was obliged to send it to a mountain enclosure, where it died.

The Wallachian Sheep is said to resemble the common Sheep in both the size and the form of its body; but it is justly considered by naturalists as a curious animal, on account of the long shaggy fleece with which it is clothed, and the upright spiral horns that adorn its head. It is, as its name implies, an inhabitant of Wallachia, Mount Ida, and Crete, and of several of the islands of the Archipelago. In Austria it is distinguished by the name of Zackl; and is almost the only one of its species in which the butchers of that country deal. It is also said to be the Strepsicheros of the ancients.

We have said that there is a great resemblance between the Wallachian and the English Sheep; and it would be interesting to know at what period of our history the cultivation of this useful animal began in Britain. This is a point, however, so deeply involved in darkness, that such an inquiry, to be made with success, would be all but hopeless. "In reviewing the different stages of social improvement, of which this island has been the theatre," says a writer on this subject, "it has been too much the practice to look upon the Roman invasion as the great standing-point, receiving, with implicit faith, whatever is supposed to bear its *imprimatur*, and to reject as fabulous everything assuming to point to a period earlier, by many centuries, than that which beheld the first legionary set foot on these shores. It must not, however, be forgotten that Britain was comparatively populous even then; and that there is abundant evidence, in the tumuli which still abound in many districts, to prove the existence of previous races, who had long passed away and been forgotten, but many interesting traces of whose domestic history are now being dug from their tombs. In these primitive catacombs, the bones of Sheep, mixed up with those of deer, wild cattle, and other animals of the chase, are frequently met with. Whether these Sheep were most prized for their flesh or for their fleeces, cannot now be well determined; but, from the fact of horns never being observed among these deposits, the presumption is, that they were a domesticated race. They, at least, did exist at the period referred to, though in limited numbers, as may be safely assumed from the physical character of the country, and the numbers of carnivorous animals which must, at one time, have infested it, as appears from the abundance of their remains."

Among the European races of Sheep there is a many-horned Iceland breed, extending very frequently, in Britain, to the common black-faced breeds of Scotland. Sheep and goats are the only animals which exhibit this multitudinous growth of horns; and, in the breed of the former, to which we have just alluded, the flocks are almost in a state of unreclaimed nature, and by far the greater proportion have more than the usual number of horns. It may also be remarked, that the same circumstance prevails among the Asiatic races. The natural horns rise in their proper places; the accessory horns usually upon the sides of the head, and are from one to three in addition. In other points there is no perceptible variation in the animal from the common characters of the breed to which it belongs.

The Sheep races of the Pyrenees are hardy, and yield a remarkably fine wool. They are very largely cultivated, and in an especial manner, which is thus described by Mr. Young, in his *Annals of Agriculture*:—"On the northern ridge, bearing to the west, are the pastures of the Spanish flocks. This ridge, however, is not the whole. There are two other mountains quite in a different situation; and the Sheep travel from one to another, as the pasturage is short or plentiful. I examined the soil of these mountain pastures, and found it, in general, stony; what, in the west of England, would be called a *stone-brash*, with some mixture of loam, and, in a few places, a little peaty. The plants are, many of them, untouched by the Sheep—many ferns, violets, &c.; but burnet and the narrow-leaved plantain are, as may be supposed, eaten close. I looked for trefoils, but found scarcely any. It was very apparent that soil and peculiarity of herbage had little to do in rendering these heights proper for Sheep. In the northern parts of Europe, the tops of mountains, half the height of these (for we were above snow in July), are bogs; all are so which I have seen in our islands; or, at least, the proportion of dry land, let the plants be what they may, will, in every country, suit Sheep. The flock is brought every night to one spot, which is situate at the end of the valley of a river, and near the port or passage of Picada: it is a level spot, sheltered from all wind. The soil is eight or nine inches deep of old dung, not at all enclosed; from the freedom from wood all round, it seems to be chosen partly for safety against wolves and bears. Near it is a very large stone, or rather rock, fallen from the mountain. This the shepherds have taken for a shelter, and have built a hut against it. Their beds are sheepskins; and their doorways so small that they crawl in. I saw no place for fire; but they have it, since they here dress the flesh of their sheep, and, in the night, sometimes keep off the bears by whirling fire-brands. I viewed their flock very carefully; and, by means of our guide and interpreter, made some inquiries of the shepherds, which they answered readily, and very civilly. A Spaniard at Venesque, a city in the Pyrenees, gives 600 livres, French (each 10½*d.* English), a year for the pasturage of his flock of 2,000 sheep. In the winter he sends them into the lower part of Catalonia, a journey of twelve or thirteen days; and when the snow is melting, in the spring, they are conducted back again. They are, the whole year, kept in motion, and moving from spot to spot, which is owing to the great range they, everywhere, have of pasture. They are always in the open air—never housed, or under cover; and never taste of any food but such as they can find on the hills."

This flock was tended by four shepherds, and from four to six large Spanish dogs of the Pyrenees breed, black and white, large as a wolf, with immense head and neck. They are defended by collars stuck with iron spikes, and no wolf has a chance with them. The bears, however, are more difficult to deal with; but even they have their work to do to defend themselves, unless they get their backs against a tree, when they may set the dogs at defiance. In the night, the shepherds place entire reliance on these animals; but, on hearing them bark, they are sure of a bear being present, when they come forth with their fire-arms, and finish him, if they can.

Mustache & Ribbed-nose Baboon

THE MUSTACHE AND RIBBED-NOSE BABOON.

ON narrowly examining the faces, and watching the varying expression of Monkeys and Baboons, we can hardly help being impressed with the idea that they are largely endowed with a cunning and a wicked sort of intelligence, delighting in the fun which may arise from the successful perpetration of practical jokes. The Ribbed-Nose Baboon was long the "Happy Jerry" of Exeter Change. in London; and a drunken rascal he became. He would do anything almost for a glass of gin. He was the property of a Mr. Cross; and is described to have been docile to his keepers, but easily exasperated by strangers. Like most drunkards, or drinking men, he was also very fond of a pipe. The *sling*, or gin and water, however, was his greatest favourite; and before he commenced his performances a glass had to be promised to be given him. His cage was supplied with a small, but strong arm-chair, in which, when commanded, he would seat himself with the gravity of a philosopher, and patiently wait for further orders. He went through all his manœuvres with the most consummate composure, in no manner discomposing himself by the slightest degree of hurry. When his keeper had presented his pipe to him, he examined the bowl with great care, sometimes inserting his finger into it, as if to know whether it was lighted before he put the stem into his mouth. He then introduced it between his *lips*, to such a length as almost to be up to the bowl, which was usually turned downwards. There he kept it for some minutes without emitting a single puff of smoke, during which he was filling his cheek-pouches and capacious mouth, which, when he opened, forth he would blow a cloud from mouth, nose, and sometimes his ears, that would fill the whole of his cage. He was then helped to a *goblet* of gin and water, which went down his throat with as great rapidity as the smoke had been emitted from his mouth. We are told that he was possessed of enormous strength; and that he fed principally upon vegetables, preferring them cooked. When he visited Windsor, to be exhibited to George IV., he dined upon hashed venison with no ordinary degree of avidity. Such was the comparatively tame Mandril, which, however, in a wild state, is the fiercest and most powerful of its race. It is a native of the Guinea Coast, and has often been seen in our menageries.

There are mustacheod, bearded, and whiskered Monkeys and Apes—some with short tails, some with long, and some with no tails at all. In their faces, all that we have seen seem to have a partial resemblance to those of some of the human family; but none of them approaches the general structure of man so nearly as the Orangs, Chimpanzees, or Gorillas. It is believed that the African Orang, found on the Guinea Coast, will attain to a height of six feet. From this fact, it may easily be conceived how formidable an animal he is to attack. He looks like a man, and has been called the wild man of the woods; but the *human* being "is the sole species of his genus, the sole representative of his order and sub-class."

The Mustache Monkey has got a beard over his upper lip, which gives him a comical appearance; and, with his large eyes, and his hair coming down so as to cover his forehead, and nearly touch the root of his nose, he seems to have rather a sportive than the melancholy expression so frequently found amongst monkeys. The anecdotes relative to nearly all the tribes are almost endless. In Martin's work on the *British Colonies*, it is stated that there is a tribe in Trinidad which have a great aversion to water; and if obliged to cross a narrow stream, they climb a tree near the bank, and form a chain by hanging from the tails of each other. The whole string of animals then swing backwards and forwards, until the lowest, to which the post of honour has been assigned, alights on the opposite bank, and pulls over, by the aid of the "tail," his companions on the tree and bank. This singular operation, it seems, is carried on amidst terrible howling, and with the most frightful cries and grimaces. One of the most peculiar of the species is the Coaita, or Spider Monkey, so called from the extraordinary length of its extremities, and the singularity of its motions. The tail of this animal answers the purposes of a hand, and enables it to throw itself actively about from branch to branch, sometimes swinging by the foot, sometimes by the hand, but oftener, and with a greater reach, by the tail. The extremity of this member is covered only with skin, forming an organ of touch as discriminating as the hand. The Coaita inhabits the woods of South America, associating in great multitudes; assailing such travellers as pass through their haunts with an infinite number of sportive and mischievous gambols; chattering, and throwing down dry sticks, swinging by their tails, and endeavouring to intimidate the passengers by a variety of menacing gestures. The general colour of this creature is black, with the exception of the face, which is of a dark flesh colour. Sometimes the tricks of monkeys are apt to give pain rather than pleasure to those who may happen to be the victims of them. A remarkable instance of this kind is recorded as having occurred on board a ship.

A vessel that sailed between Whitehaven and Jamaica, embarked, among other passengers on their homeward voyage, a female, who had at her breast a child only a few weeks old. One beautiful afternoon the captain perceived a distant sail, and after he had gratified his curiosity, he politely offered the glass to his passenger, that she might obtain a clear view of the object. Having the baby in her arms, she wrapped her shawl about it, and laid it down upon a sofa on which she had been sitting. She had hardly applied the glass to her eye, when the helmsman exclaimed, "See! what the mischievous monkey has done." The reader may judge of the mother's feelings, when, on turning round, she beheld the animal in the act of transporting her beloved child apparently to the very top of the mast! The monkey was a very large one, and so strong and active, that, while it grasped the infant firmly with the one arm, it climbed the shrouds nimbly by the other, totally unembarrassed by the weight of its burden. One look was sufficient for the terrified mother, and that look had well-nigh been her last; and had she not received the assistance of those around her, she would have fallen prostrate on the deck, where, as it was, she was soon afterwards stretched apparently a lifeless corpse. The sailors could climb as well as the monkey; but the latter watched their motions narrowly; and as it ascended higher up the mast the moment they attempted to put a foot on the shrouds, the captain became afraid that it would drop the child, and endeavour to escape by leaping from one mast to another. In the meantime the child was heard to cry; and though many thought it was suffering pain, their fears on this point were speedily dissipated, when they observed the monkey imitating exactly the motions of a nurse by dancing, soothing, and caressing its charge, and even endeavouring to hush it asleep. From the deck the lady was conveyed to the cabin, and gradually restored to her senses. In the meantime the captain ordered every man to conceal himself below, and quietly took his own station on the cabin stair, where he could see all that passed without being seen. This plan happily succeeded. The monkey, on perceiving that the way was clear, cautiously descended from his lofty perch, and replaced the infant on the sofa, cold, fretful, and, perhaps, frightened; but, in every respect, as free from harm as when he took it up.

Striped Hyena.

HYÆNAS.

THE Arabs consider the Hyæna as the symbol of stubbornness. The muscles of its jaws, assisted by those of the neck, are so powerful, that it is almost impossible to drag from its terrible hold the thing which it has once seized. Cuvier remarks, that its efforts, in this way, sometimes produce anchylosis of the cervical vertebræ; and that this has given rise to the assertion, that Hyænas have but a single bone in the neck. The tongue is rough, and the feet are possessed of four toes each. The same author sums up the character of the whole species by saying, that they are voracious, nocturnal animals, inhabiting caverns, living mostly on carcasses, for which they even rob the tombs; and that they are the subjects of an endless number of traditional superstitions. In the narrative of Colonel Denham, their enormous capability of dragging large bodies along the ground is strikingly exemplified. At Kouka, he informs us that the Hyænas, which were everywhere about in legions, became so extremely ravenous, that a considerable village, where, on his duck-shooting excursions, he sometimes obtained a draught of sour milk, had been attacked the night before his last visit, the place absolutely carried by storm—notwithstanding defences of the prickly tulloh, nearly six feet high—and a couple of donkeys carried off, in spite of the efforts of the people. "We constantly," continues Colonel Denham, "heard them close to the walls of our own town at nights; and, on a gate being left partly open, they would enter and carry off any unfortunate animal that they could find in the streets." From the same narrative, it appears that it was necessary to protect the graves from the attacks of these rapacious brutes. The grave of a Mr. Toole had a pile of thorns and branches of the prickly tulloh, several feet high, raised over it, as a protection against the flocks of Hyænas which nightly infested the grave-yards in that country.

The Striped Hyæna is supposed to be the one alluded to in the scriptural writings, where the "valley of Zeboim" is spoken of, and which has been translated as the valley of the Hyænas. Respecting this animal, the fables were very abundant in ancient times, especially as to its power of imitating the language of men, in order to induce Arcadian shepherds to approach it, when it would seize them, and devour them at its leisure. This was an innocent pastime for a Hyæna; but it was also said to be possessed of the power of charming dogs, so that they became dumb. Although its habits were known, it does not appear to have been exhibited at Rome till a comparatively late period. The third Gordian seems to have been the first who so introduced it; and ten are said to have been shown at the games celebrated by the Emperor Philip, about A.D. 247. As its appearance is strikingly represented in the accompanying engraving, we will here indicate some of its habits, in preference to occupying our space with a description of its physical form.

Pennant observes, that the propensity of the Striped Hyæna to violate the repositories of the dead, and greedily devour their contents, is generally known; and also states, that it preys upon herds and flocks. Besides these disgusting and destructive propensities, he adds, on the authority of Shaw, that it will eat the roots of plants, and feed on the tender shoots of palms. It is through sheer necessity, however, that it becomes a vegetarian. He describes it as a most unsociable animal, inhabiting caves, and the larger crevices of rocks; solitary and savage; and inspiring even the Arabs with a strong feeling of superstitious dread. So much is this the case, that when any of this people happen to kill one, they carefully inter its head, lest it should be used for magical purposes. To some such end the neck of the animal was applied of old, by the Thessalian sorceress, as indicated by the lines of Lucan—

> "Nor entrails of the spotted lynx she lacks,
> Nor bony joints from fell Hyæna's backs."

It is asserted that, about Gahubron, in the season when the inhabitants sleep in the open air, it will snatch away children from the very sides of their parents. The Striped Hyæna is found in Asia, Northern and Central Africa, the mountains of Caucasus and the Altaic Chain, Asiatic Turkey, Persia, Syria, Barbary, and Senegal; even so low as the Cape. Its aspect may be described as terrifying; and its nature fierce and cruel, yet courageous. It is a wary combatant; and will face larger and stronger wild animals than itself.

Another species is the Spotted Hyæna, somewhat smaller than the Striped, and inhabiting Southern Africa, especially in the neighbourhood of the Cape. It is, however, said to be found as high as Barbary; and is described as being near akin to the wolf, and among the most voracious of wild beasts. It not only, by night and by stealth, but openly, in the middle of the day, preys upon everything that falls in its way, in the shape of man or beast; and, rather than fail, will dig down the walls of stables and houses to get at its prey. It is said to be the offspring of a Hyæna and a lioness; and is familiar in Ethiopia. "The character of this Hyæna," says the writer of the *Catalogue of the African Museum*, "makes his destruction an object of no small importance to the farmers [of South Africa], whose ingenious snares for him call forth amazing cunning and dexterity, on the part of the animal, to render them of no avail. The more common methods employed against beasts of prey, such as spring-guns and traps, do not succeed in this case. During his nocturnal wanderings he minutely examines every object that presents itself to his notice with which he is not perfectly familiar; and if he see reason to suspect that it can injure him, he will turn back, and make his way in an opposite direction. Thus cords of leather thongs, which are often laid across the footpaths the Hyæna is accustomed to travel on, and which are attached to the triggers of loaded guns, with the design that his contact with the thong may cause the discharge of the gun in his direction, are very carefully examined by him, and the usual result of his examination is, his deciding against trusting himself in contact with them. The farmers have so often observed this result, that they now very rarely attempt his destruction by this means; but occasionally succeed by substituting, for cords, the delicate stems of creeping plants, which are regarded by him without suspicion until he has actually suffered from them. Many other ingenious methods, suggested by the necessity of the case, have been adopted by the farmers for destroying the Hyæna; but it is needless to describe them here." It may be observed, however, that night is his favourite time for seeking his prey, when his howl is regularly heard, to the great intimidation of many other animals, which then seek their hiding-places as swiftly as they can. His propensity to howl, therefore, would seem to be unfavourable to him; and for what reason it is put into practice, is not easily to be conceived. "Some have surmised it to be his call to creatures of his own species; but that this is not the case, is certain from the fact, that Hyænas are heard to utter their supposed call even while separating from each other farther and farther as each howl is given. In addition to this, it may be remarked, that it is contrary to the habit of this animal to hunt in company, or even to congregate in large numbers, save when assembled by the temptation of an abundance of carrion." A writer suggests, that the object may be to inspire terror, as the Hyæna's plan of attack is founded upon intimidation.

The Flying & Virginian Opossums.

OPOSSUMS.

THE New World, as America is called, in distinction from the Old (which comprises Asia, Africa, and Europe), has, in the northern half, its scenery diversified with alternate forests and prairies—the one consisting of huge timber-trees, and the other enlivened with lovely grasses, and enamelled with beautiful flowers, when the budding and blowing season sets in upon the land. Amongst the trees are numerous species of the oak and pine, with the beech, ash, birch, black and white cedar, cypress, chesnut, locust, juniper, hickory, poplar, mulberry, and walnut. Here is both exuberance and variety. In advancing to the higher localities, beyond the parallel of 50°, the pines increase, and the aspen, poplar, larch, alder, hazel, and willow, exhibit the more characteristic forms of arboraceous existence. The sugar-maple, elm, ash, and Canadian cedar-tree, cease at about the 54th degree of latitude, not being found further north than Saskatchewan. As we approach the shores of the Arctic Sea, and the north-western coasts of Hudson's Bay, arborescent life becomes more stunted, and one species of tree after another gradually disappears from the scene. Beyond the Polar Circle not a single tree is to be seen. Nothing but mosses, lichens, and a few dwarf shrubs, come within the view, and constitute the only vegetation which covers the dreary plains.

Returning from this sterile region, and penetrating the immense forests on the east of the Mississippi, we cross that river, and enter upon the land of prairies and buffaloes. The first view of this region probably excites more surprise in the mind of a traveller in the United States, than the grandest objects of nature. In describing it, Stewart says, that, "riding, day after day, in the forests through which the cleared land is not of sufficient extent to interrupt the general aspect of wood, he breaks, at once, upon the view of a fine open country—he beholds extensive plains of the most soft and beautiful verdures, covered with flowers of every scent and hue. Occasionally in the prairie, and often in the centre, are clumps of fine trees (especially of the oak and black walnut), so charmingly disposed, that the traveller can hardly believe that they have not been placed by the hand of man. The views of tracks of country of this description are, in many places, far more extensive than are to be met with in any country whose land has been laid out in this way artificially, with a view to its beauty, and to increase its value to its possessor. The prospect from the high grounds that often surround the prairies, comprehending verdant lawns, large forests, through which vast rivers are rolling their mighty masses (volumes) of water, and pine hills in the distance, with cottages, cattle, horses, and deer, is, altogether, as fine as can be conceived anywhere."

Associated with these magnificent features of scenery, there are some peculiar species of animals in the zoology of the New World. Indeed, this differs more strikingly from that of the Old World, than even its forms of vegetable life. The animals common to both continents are almost entirely circumscribed to the northern parts of America; and consist chiefly of the fur-producing sorts, with some aquatic birds, and a limited number of fishes. On the whole, the types of indigenous American animal life are inferior in size to those of the old continents. They are, likewise, generally of inferior usefulness to man, and less calculated to improve his intelligence by suggesting the means of adapting them to his purposes, and advancing him in the scale of civilisation. Neither the elephant nor the camel has naturally an American existence; nor were the horse, the ox, the sheep, or the hog known in this division of the globe until after it was discovered by Columbus; although, in a state of complete domestication, they now exist in abundance; whilst immense herds of both oxen and horses, in a wild state, roam over the boundless plains in the southern portion of this vast continent.

Besides oxen and horses, there are, in South America, many wild animals, and some of them of a dangerous kind; whilst, in the United States, there is but one species of Opossum, which is found in Virginia. This state lies between the 30th and 35th parallel, and is rich both in cotton and tobacco. The Opossum family (*Marsupialia*) is not met with in the Old World, but abounds in the south division of Central America, as well as in Australia. Wild animals, however, gradually disappear before the advancement of man. As their haunts are invaded, they flee for safety into the deep recesses of the forest, or seek the caverned cliff as a secret hiding-place from his dreaded approach. He destroys them either for the sake of their food, or for some purpose for which he considers them useful. The elephant is hunted for its tusk, and the Opossum for its skin, which forms a covering for the body of the American Indian, as well as for that of the Australian savage.

In hunting the Opossum in America, it will readily be believed that the weapon adopted is of a very different construction from that with which it is hunted in Australia. The rifle of the Virginian is brought to bear upon the animal in his forest retreats in the New World; but among the eucalyptic woods of the only continent entirely within the southern hemisphere, the tomahawk of the Australian has to serve the same purpose. The interest which attaches to the one is as nothing when compared with that which attaches to the other. We will, therefore, briefly describe the manner in which the native Australian possesses himself of his Opossum prey. In roaming the forests he examines the trees for the marks of the feet of the animal; and when these are discovered, he at once commences to ascend the huge stem in the following manner:—Having satisfied himself respecting the inclination of the tree, he begins by cutting, with his tomahawk, a notch no larger than is sufficient to admit into it the insertion of his great toe. The height of this is generally about two-and-a-half feet from the ground, although this distance depends upon the individual; for it is a remarkable fact, that the aborigines will not ascend by each other's notches or steps, even though the same tree has been ascended by several of them. He then cuts another notch, from two to three feet higher, for his left foot, and striking his weapon as high as he can reach into the tree, he pulls himself up by the handle into the second notch. His left great toe being now similarly placed as had been his right in the first notch, he supports his whole weight upon it, keeping his left arm round the tree whilst making two more notches as before. In this manner the native Australian will ascend a eucalyptus of immense size, rising to a height of from forty to fifty feet without a branch, and with as much confidence and celerity as a practised Irish labourer will mount a ladder.

Having reached the hole where the Opossum is supposed to be, he thrusts the handle of his tomahawk into it; and if he is convinced of the presence of the animal, he cuts away at the tree with great vigour, when the Opossum usually springs out, and instantly receives his death wound from the unerring aim of the hunter. The wanderer through Australian woods will find, that when night sets in, the whole tribes of the Opossum and squirrel kinds emerge from their hiding-places, and come forth to feed, as they usually sleep by day. Their chuckling, squeaking, and screeching, have a singular effect during the vigils of Diana; whilst the flying squirrels, some white and some black, may be regarded as a high source of amusement, as they dive from the top of one tree to the trunk of another, lowering themselves by their long fur tails, as seen by the rays of the silvery moon. It is a strange and a singular exhibition among the animal tribes of a eucalyptic forest, and must be seen to be properly appreciated.

Kangaroo.

THE KANGAROO.

AUSTRALIA may be regarded as the principal habitation of the Kangaroo. This immense island—a continent in itself—lies entirely within the southern hemisphere; its most northern point being Cape York, in 10° 42′ to the south of the equator, and its southern extremity being Cape Wilson, in 39° 9′ south latitude. A straight line made between these points measures upwards of 2,000 miles; but the average extent of Australia, from north to south, is about 1,200 miles. The most western point of the mainland is called Steep Point, in latitude 113°; and its most eastern is Cape Byron, in 153° 47′, east of the meridian of Greenwich. Its greatest extent, in this direction, is 2,400 miles. The Australian variety of mankind who inhabit this continent, are subdivided into the Oceanic, or Pelagian Negroes, and the Alforas, or Haraforas. The former occupy portions of New Guinea, with the neighbouring islands, and have strong bushy hair, resembling the negroes of Africa. The Alforas inhabit Australia, and some of the other islands in the seas of that region, and are a very degraded race, with slender limbs, and lank black hair.

The largest native animal of Australia is the Kangaroo, which belongs to the order of quadrupeds called the Marsupial; and upwards of two-thirds of its mammalia come within the category of this division of the animal kingdom. Three of the great orders into which the mammalia are divided have no representatives in the zoology of Australia—namely, the Quadrumana, the Pachydermata, and the Ruminating quadrupeds. None of the monkey tribe is native to this continent, nor any of the thick-skinned animals, such as the elephant, rhinoceros, and horse; neither were oxen, sheep, deer, nor other ruminants found, originally, to inhabit its plains or forests. The dingo, or native dog, is the only animal of prey, none of the larger wild animals being found within its limits. Among the marsupials, opossums are numerous; and there are several small varieties of the Kangaroo species, such as the kangaroo-rat and others; but the large Kangaroo is, perhaps, the only wild animal of the greatest interest to both the natives and the settlers. Although in some degree foreign to the immediate subject before us, we must observe that one of the most remarkable animals of Australia is the *ornithorhynchus*, a curious semi-aquatic creature, with the body of an otter, and the bill of a duck. This singular compound, formed apparently in some freak of Nature, is oviparous. It frequents the margins of lakes and rivers; but remains mostly in the water, and is only approached with difficulty, because of its extreme shyness. Nearly the whole of the animals found in Australia are of distinct species from those inhabiting other parts of the globe, and are peculiar to that country. The entire number of its native species includes scarcely more than a twentieth part of the total list of known mammalia, and the paucity of individuals is quite as remarkable as the limited number of species. In the interior, the traveller may pass over many hundred miles of country without having his weary eyes relieved from the monotony of still life by the appearance of a single quadruped, and almost without perceiving even the traces of any terrestrial living thing.

It might be supposed, that where there is such an apparent absence of animal life, it would go hard with the wild native tribes to subsist; but even here Nature has been provident to man. Kangaroos, opossums, kangaroo-rats, wombats, bandicoots, grubs, ants' eggs, and even honey, have been abundantly provided. A settler who went hunting one morning with some of the natives, started from its nest, built of grass and hair, on the ground, a kangaroo-rat; but as it hopped along with incredible speed, a blow from a tomahawk, thrown by a young native, put a stop to its progress. These little animals are Kangaroos in miniature; their heads, legs, and tails being similar to those of the larger animal, and they hop in the same manner; though, from their colour and diminutive size, they resemble a rat. Their weight is about that of a guinea-pig. Another of the natives knocked over a bandicoot, a burrowing animal, not unlike a rabbit, being about the same size, and with flesh, when cooked, both white and palatable. Within the compass of a couple of hours, this sportsman saw the natives by whom he was accompanied, collect several of the animals we have mentioned, with grubs, ants' eggs, and honey, without much exertion; and having appeased their hunger, they were perfectly satisfied with the provision which had been made for them.

The Kangaroo is now so well known, and has so often been described, that little need be said here respecting its haunts and habits. The largest are found in the open forest-lands, and are commonly called "Foresters" and "Fliers." The former do not congregate in herds, but are usually found pasturing by themselves. These are of an immense size, weighing sometimes from 150 to 200 pounds. The latter appear in herds numbering fifty or sixty; and both give fine exercise to the sportsman. They are of a gray colour; and though esteemed harmless, and easily tamed, they are capable of offering a desperate resistance when attacked, and contend with the dogs with such courage and determination, that these are often severely wounded, and frequently killed.

The mode of hunting the Kangaroo leaves it little chance of escape. Many ludicrous scenes have been witnessed in this sport, when the Kangaroo and the dog singly encounter each other. In travelling through an unfrequented forest, it is no uncommon circumstance to come upon an "Old Man" (as the Kangaroo is called) by surprise, when, both confounded and confused, it boldly passes through the hunting party, and makes off down a hill, if possible. A dog overtakes and challenges him, when the Kangaroo turns round, seizes his foe with his two arms—as a policeman does the burglar—wrestles, throws, and frequently wounds the dog by a cut with the pointed horn of his foot. Away then bounds the Kangaroo; but the dog is instantly up, and after him. Another battle, and another flight and pursuit—the one running for life, the other for conquest. Again they grapple; but the Kangaroo is this time seized by the throat, and overcome. The dog, however, has received a dreadful gash in the chest, which, if curable, is immediately sewn together. Although often defeated, the Kangaroo frequently escapes from a single dog; but as two or more of the canine species are usually in the field, he rarely escapes with his life.

There is another kind of Kangaroo, called the Wallaly, which mostly haunts the brush-lands. It is of smaller proportions than the others; of a very dark colour; and when hunted, often owes its preservation to the thickness of the underwood amongst which it makes its habitat. Two other species are respectively designated the Wallaroo and the Warrang, which are altogether different from those described above. They are of a rich brown colour, and much smaller. In choice of place, and hardihood of subsistence, there is as great a distinction between them, as there is between the habits of the goat and those of the sheep. They are only found among the bare rocks, and amongst the craggy precipices of deep ravines. Finding their home among cliffs, they bound from point to point with the precision of the chamois, and thus are enabled to set the dogs at defiance. They cannot, however, withstand the destructive inventiveness of man, as they fall before his rifle whenever they come within reach of its deadly range.

Tiger

THE TIGER.

NOTWITHSTANDING the beautiful stripes and colours with which the Tiger is marked, and the limber form and lithesome tail with which he is possessed, his terrific aspect, and stealthy, silent step of assassination, are calculated to inspire dread the moment he is beheld. In the hunting of this formidable inhabitant of the jungle, the elephant is a most useful assistant, and displays a degree of sagacity which greatly helps to entitle him to the lofty cognomen of "half-reasoning" bestowed upon him. On these occasions, such is the care of the *mohaut*, or rider, that in passing through the jungles he will turn the overhanging branch of the tree out of his way or that of the *howdah*—the seat on its back—although the elephant himself could easily pass under it. Here is not only intelligence, but benevolence. If the branch be too inflexible, he will seize it with his trunk, and rend it off rather than suffer it to be in the way of his master. His scent, although perhaps not keen, is yet sufficiently so to detect a Tiger at some distance. When this is the case, he utters a shrill cry: but it is in the attack that he brings his qualities mostly into view. When this is about to take place, he raises his trunk to nearly a perpendicular, so that when the Tiger advances, he may be prepared to strike, and not to be taken by surprise; for if his feline foe is enabled to fasten itself on the trunk, the elephant is immediately powerless. Notwithstanding the extraordinary spring which the Tiger takes in its attack, a well-trained elephant will generally succeed in dashing it to the earth with his trunk, when, if the Tiger be stunned or maimed, or wounded by the rifle of the rider, the ponderous foot of the mighty beast crushes the fallen victim, and at once completes its destruction. It occasionally happens, however, that an elephant declines the contest, and turns from the scene. When this is the case, the life of the rider is in the greatest peril; for the Tiger will, with cat-like rapidity, spring upon the elephant in the rear, drag the rider from his *howdah*, and before he has had an opportunity to defend himself, carry him off to his hiding-place in the jungle. In Statham's *Indian Recollections*, there is given an instance of this kind.

A party of Europeans proceeded to the jungle for the purpose of hunting Tigers, and they were very soon successful with a full-grown Tigress, which, with the greatest courage, at once charged the line of elephants upon which the sportsmen were seated. At the direct point of attack there happened to be a lately-purchased female elephant, which had not, hitherto, been tried with such dangerous game; so the moment she beheld the *quarry*, she turned and fled in terror from the field. The *mohaut* could not make her turn, when the Tigress sprang upon her back, and seizing one of the sportsmen in the *howdah* by the thigh, at once brought him to the ground. She then threw him, quite stunned by the fall from the elephant's back, over her shoulder, and in the same manner as a fox carries a goose, made off with him to the jungle. Every rifle was pointed at her; but from the position in which her victim was carried, they dared not fire. Her load seemed to be no incumbrance to her, as she dashed through the jungle-grass at a pace far beyond that of the following elephants; and the party soon lost sight of both her and their friend. They tracked her, however, by the blood which streamed from her victim; and after much searching, at length came upon her, lying dead, with the limb of their companion yet in her jaws. He was still living, but so faint from the loss of blood that he could not speak. To extricate his limb from the fangs of the Tigress, her head had to be severed from her body, when the wound was dressed, as one of the party fortunately happened to be a surgeon. The sufferer was taken to the nearest bungalow, where, with care, he shortly afterwards recovered. How he became the victor, instead of the victim, he explained by stating, that after recovering from the stunning effects of his fall, and finding himself on the shoulders of the Tigress, he recollected that he had a pair of pistols in his girdle. After several unsuccessful attempts to draw one, he at length succeeded, and presenting it at the creature's head, fired, but ineffectually. He wounded her, but this only made her fangs go deeper into his flesh, give him a shake, as a dog does to himself when he comes out of the water, and trot a little faster. This treatment, for some minutes, deprived him of his consciousness; but, on recovering himself, he drew his other pistol, and pointing the muzzle directly under the blade-bone of the shoulder, towards the heart, fired, and the animal fell without so much as a groan.

There is another way of hunting the Tiger, attended with much less risk than the one we have just narrated. This is by shooting him from a platform. The existence of one of these animals in a neighbourhood is usually discovered by the loss of cattle, or by the disappearance of some unfortunate herdsman. When this occurs, the haunt of the animal is ascertained; then the carcass of a bullock or deer is placed at the foot of a tree in some adjacent open spot. Next, a platform is fastened to the tree, amidst its branches. On this the hunter takes his stand, provided with one or more rifles, and patiently awaits the approach of the carnivorous animal. This usually happens towards the evening, when he comes forth from his hiding-place, seeking whom he may devour. Then may be seen all the minor beasts of prey successively retiring from the bait which has been laid to attract the Tiger. As he slowly, cautiously, and stealthily approaches with the treacherous pace peculiar to all the feline tribe, the hunter is enabled to take a deliberate aim, and the brute generally drops on receiving the bullet of the first or second barrel. Hindostan is now the greatest habitat of this ferocious, though beautiful animal.

The ancients make frequent mention of the Tiger; and Aristotle must have been acquainted with it, although he speaks of a breed in India between this animal and the dog. This breed may have been the cheetah, the hunting animal of Hindostan. To quote from our own history, Pliny describes the tremendous velocity of the Tiger, and the devoted attachment of the maternal animal to her young. Oppian speaks of swift Tigers; and Mr. Bell, the traveller, was, in China, a witness of its extraordinary celerity of action. There the chasing of this animal is a favourite pastime of the sovereigns of that country.

In some districts of India and Sumatra, the devastations which this ferocious brute makes are frightful. According to Colonel Sykes, in the province of Khandeish alone, 1,032 Tigers were destroyed between the years 1825 and 1829. This is from an official return. "In Sumatra the natives rarely try to kill them, believing that these animals, being outwardly so beautiful, are inspired by the souls of their ancestors." Tiger-hunting is a favourite sport of Oriental countries, perhaps as much on account of its danger as anything else; but horsemen, as well as persons on foot, on these occasions, are present more to be in at the death of the animal, than really to hunt him or encounter him as a dangerous foe. It is to the armed riders on elephants that the work of rousing the Tiger from his covert belongs, and of firing at him as he endeavours to make his escape. If he fail in this object, he then attacks, and is both a powerful and ferocious competitor.

[illegible]

THE BROWN BEAR.

THE Brown Bear is an inhabitant of Canada and the northern regions of Europe, where the vast forests which form one of the principal features of these countries, afford him alike a shelter and the means of subsistence. He is an animal of great strength, and often exhibits a wonderful degree of sagacity. We saw one but the other day, begging with his master, even in the streets of London; and although he was not one of the handsomest-looking creatures in the world, still his *countenance* expressed absolutely none of the ferocious characteristics of a wild beast. When attacked in his native forests, however, he is by no means harmless, but is both fierce and courageous, frequently inflicting severe wounds upon his foes. "An old chasseur, near to Gefle, named Jaderstrom, assured me," says Mr. Lloyd, a northern bear-hunter, "that on one occasion a party of seven Finns and Laps attacked a Bear upon their skedor (snow-shoes); but they did not succeed in destroying the beast until five of them were severely wounded; one of them was entirely scalped. Jaderstrom was not present himself on this occasion; but he saw the Bear and the wounded men brought down from the forest. Lieutenant Oldenburg mentioned several instances of people being wounded by Bears, when pursuing them on snow skidor, that came within his own knowledge. A peasant, indeed, with whom he once lodged in the parish of Ora, in Jamptland, had been severely lacerated by one of them. The man, in company with several others, was in pursuit of the animal; but being the best runner of the party, he was the first to come up with him, when, discharging his rifle, he severely wounded the beast. The latter, in his turn, now rushed at the hunter, who, to save himself, wheeled about, and endeavoured to get out of the way. He presently, however, came to a little precipice, or steep declivity, down which he tumbled headlong, and, in a moment afterwards, the Bear was on him. The ferocious animal now quickly tore out one of his eyes, and otherwise wounded him severely in the body. He, besides, bit him so badly in the hand that he ever afterwards lost the use of three of his fingers. It is probable, indeed, he would have killed him, had not his companions, at last, come to the brow of the precipice, when, seeing the Bear seated on the poor fellow's body, they immediately shot him through the head."

The writer, in a long journey on foot through the northern states of America and Lower Canada, frequently encountered men who had hunted the Bear, and who narrated many wondrous stories of his prowess, which, however, was usually overcome by their own. On one occasion he slept at the foot of a tree, in the neighbourhood of a Bear and her cubs, all of which were shot on the following morning. He himself, being alone, had not the slightest idea that he was so near the haunt of these shaggy monsters, or he would not, probably, have gone to sleep with a mind so perfectly at ease, as it usually was, during his solitary wanderings of some thousands of miles amongst the sparsely peopled wilds of the New World. One informant told us that, on one occasion, he defeated a Bear which stood in his path with a blow on the nose from the butt-end of his riding-whip, that being, externally, the tenderest and most vulnerable part of the animal. Another, that he caught an old Bruin which had nearly desolated his sheepfolds, by tempting him with a mixture of molasses and rum. The animal being fond of sweets, had eagerly gorged himself with the molasses, and becoming drunk with the rum, lost his feet, and was easily slain. Not only in Canada, however, but in the northern parts of Europe, the Bear is hunted with great vigour. Here the experienced hunter often *rings* the animal with unerring certainty. This *ringing* process is adopted for the purpose of ascertaining where a Bear has taken up his abode for the winter, and is performed in the following manner:—When there is snow upon the ground, and the track of the animal (resembling, in some measure, that of a human being) is discovered, a person follows it until there is reason to believe that the Bear may have taken up his quarters in the neighbourhood. This is indicated by his proceeding very slowly, and in a crooked direction, or rather by his doubling in the same manner as a hare; for as long as he goes in a straight line, he has no intention of lying down. The man now quits the track, and begins to make an extended *ring* or circle round that part of the forest where he suspects the Bear is to be found. Should he succeed in completing this without again falling-in with the track, he, as a matter of course, is positively assured that the retreat of the animal is within the circle. But if, on the contrary, he finds that the beast has proceeded beyond his intended circle, he commences another ring, and so continues until he has succeeded in accomplishing his object. The size of the ring depends altogether upon circumstances; such as the season of the year, the locality, the state of the snow, and other objects. Consequently, though some circles may not be more than a single mile in circumference, others may extend to six, eight, or even more miles. Properly to *ring* a Bear requires much experience; and whilst engaged in it, the greatest silence must be preserved, as well as the most vigilant circumspection.

Mr. Lloyd relates an adventure of his with a huge he-bear, which, in the summer previous to his hunting him, had slaughtered above twenty horses in the neighbourhood of the place he was staying at. "Very fortunately, my man Ely," says he, "in his rambles through the forest at the setting-in of the winter, fell-in with and ringed the tracks of the beast. This was at no considerable distance from the northern extremity of Moss-join, of the lake of which I have more than once spoken; but as at that time there was little snow in the forest, we left him undisturbed until the week before Christmas. At that period, Ely and myself, without any more company, proceeded to the ring, which we searched in our usual cautious and silent manner; but it was not until the evening of the second day, owing to the circle being of great extent, that we met with the beast: he, however, was so much on his guard, that before we observed his lair, he bolted from it, and moved off. At this time the fellow was not more than twenty paces distant; but owing to the trees being loaded with snow, I only got the merest glimpse possible of him. I, nevertheless, fired one of my barrels, which was charged with two balls; but the brake was so thick, that one, if not both of them, was interrupted by the intervening trees, and, in consequence, he escaped unhurt." They still followed him, however; and, after a long pursuit, and much fatigue through the snow, they came up with him. "I had not proceeded more than two or three paces, when a most terrific and lengthened growl announced that the Bear was still in existence; and the next moment, and at only some ten or twelve paces distant (the quantity of snow which was hanging on the trees, having prevented me from previously observing him), I viewed the fellow dashing forward at a gallop: fortunately, I was not altogether taken by surprise, for my double gun was not only out of its case, but both locks were on full cock. This was well, for the beast came at such a rattling pace, that by the time I had discharged my second barrel, he was within less than a couple of paces of the muzzle of my gun. When I fired my last shot he was not coming directly towards me; for either my first had turned him, or he did not observe us, owing to the closeness of the cover. By swerving my body on one side, however —for I had no time to move my feet—he luckily passed close alongside without offering me any molestation. This, indeed, I apprehend was out of his power; for, after receiving the contents of my last barrel, he slackened his pace, and by the time he had proceeded some few steps further, life was extinct, and he sank to rise no more."

THE ILLUSTRATED

NATURAL HISTORY OF ANIMALS.

CLASS MAMMALIA.

MAN (*Latin*, HOMO).

MAN stands in the first order of mammalia, and is distinguished by two hands, which constitute his superior extremities. All his teeth are of equal length, and arranged perpendicularly; his nails are flat, and his body uncovered with hair; his form is erect, and he is possessed of the attributes of reason. He is the only species of this order, although that contains several varieties.

"To what extent," says Professor Owen, "it may be asked, does man depart from the typical character of his species?" With regard to the kind and amount of variety in mankind, we find, propagable and characteristic of race, a difference of stature, a difference in regard to colour of skin, difference in both colour and texture of the hair, and certain differences in the osseous frame-work.

"As to stature, the Bushmen of South Africa, and the natives of Lapland, exhibit the extreme of diminution, ranging from four to five feet. Some of the Germanic races, and the Patagonian Indians, exhibit the opposite extreme, ranging from six to seven feet. The medium size prevails generally throughout the races of mankind.

"With reference to the characteristics of colour, which are extreme, we have now opportunities of knowing how much the character is the result of the influence of climate. We know it more particularly by that most valuable mode of testing such influences which we derive from the peculiarity the Jewish race. For eighteen hundred years that race has been dispersed in different latitudes and climates, and they have preserved themselves distinct from intermixture with other races of mankind. There are some Jews still lingering in the valleys of the Jordan, having been oppressed by the successive conquerors of Syria for ages—a low race of people, and described by trustworthy travellers as being as black as any of the Ethiopian races. Others of the Jewish people, participating in European civilisation, and dwelling in the northern nations, show instances of the light complexion, the blue eyes, and light hair of the Scandinavian families. The condition of the Hebrews, since their dispersion, has not been such as to admit of much admixture by the proselytism of household slaves. We are thus led to account for the differences in colour by the influence of climate, without having to refer them to original or specific distinctions.

"As to the difference in size in mankind, it is slight in comparison with what we observe in the races of the domestic dog, where the extremes of size are much greater than can be found in any races of the human species.

"With reference to the modifications of the bony structure, as characteristic of the races of mankind, they are almost confined to the pelvis and the cranium. In the pelvis the difference is a slight, yet apparently a constant one. The pelvis of the adult negro may sometimes be distinguished from that of the European by the greater proportional length and less proportional breadth of the iliac bones; but how trifling is this difference compared with that marked distinction in the pelvis which the gorilla and the ourang-outang present!"

With regard to the cranial differences, Professor Owen made a selection, for comparison, of three extreme specimens of skulls characteristic of race. One of these was an aboriginal of Van Diemen's Land (the lowest of the Melanian, or dark-coloured family); another, a well-marked Mongolian; and a third, a well-formed European skull. The differences he found to be chiefly these:—"In the low, uneducated, uncivilised races, the brain is rather smaller than in the higher, more civilised, and more educated races; consequently the cranium rises and expands in a less degree. Concomitant with this contraction of the brain-case, is a greater projection of the fore-part of the face; whether it may be from a longer exercise of the practice of suckling, or a more habitual application of the teeth in the pre-maxillary part of the jaw, and in the corresponding part of the lower jaw, in biting and gnawing tough, raw, uncooked substances—the anterior alveolar part of the jaws does project more in these lower races; but still to an insignificant extent compared with the prominence of that part of the skull in the large apes. And while alluding to them, I may advert to the distinction between them and the lowest of the human races, which is afforded by the pre-maxillary bone already referred to. In the young ourang-outang, even when the change of dentition has begun, the suture between that bone and the maxillary is present; and it is not until the large canine teeth are developed that the stimulus of the vascular system, in the concomitant expansion and growth of the alveoli, tends to obliterate the suture. In the young chimpanzee, the maxillary suture disappears earlier, at least on the facial surface of the upper jaw. In the human subject those traces disappear still earlier; and in regard to the exterior alveolar plates, the intermaxillary and maxillary bones are connate. But there may be always traced, in the human fœtus, the indications of the palatal and nasal portions of the maxillo-intermaxillary suture, of which the poet Goethe was the first to appreciate the full significance.

"In the Mongolian skull there is a peculiar development of the cheek-bones, giving great breadth and flatness to the face, a broad cranium, with a low forehead, and often with the sides sloping away from the median sagittal tract, something like a roof; whereas in the European, there is, combined with greater capacity of the cranium, a more regular and beautiful oval form, a loftier and more expanded brow, a minor prominence of the malars, and a less projection of the upper and lower jaws. All these characteristics necessarily occasion slight differences in the facial angle. On a comparison of the basis cranii, the strictly bimanous characteristics in the position of the foramen magnum and occipital condyles, and of the zygomatic arches, are as well displayed in the lowest as in the highest varieties of the human species."

Respecting the value to be assigned to the above defined distinctions of race, in consequence of none of these differences being equivalent to those characteristics of the skeleton, or other parts of the frame, upon which specific differences are founded by naturalists in reference to the rest of the animal creation, Mr. Owen says—"I have come to the conclusion that man forms one species, and that these differences are but indicative of varieties. As to the number of those varieties; from the very well-marked and natural character of the species, just as in the case of the similarly natural and circumscribed class of birds, scarcely any two ethnologists agree as to the number of the divisions, or as to the characters upon which those varieties are to be defined and circumscribed. In the subdivision of the class of birds, the ornithological systems vary from two orders to thirty orders; so with man there are classifications of races varying from thirty to the three predominant ones which Blumenbach first clearly pointed out—the Ethiopian, the Mongolian, and the Caucasian, or Indo-European. These varieties merge into one another by easy gradations. The Malay and the Polynesian link the Mongolian and the Indian varieties; and the Indian is linked by the Esquimaux again to the Mongolian. The inhabitants of the Andaman Islands, New Caledonia, New Guinea, and Australia, in a minor degree, seem to fill up the hiatus the Malayan and the Ethiopian varieties; and in no case can a well-marked definite line be drawn between the physical characteristics of allied varieties; these merging more or less gradationally the one into the other"

In Dr. Latham's admirable essay on Ethnology in the 'Circle of the Sciences,' he defines some of the principal characteristics of the human skull or cranium; and it is necessary that these should be known by those who would study the varieties of the human race. Thus, then, the distance between the two parietal bones of the cranium is, what is technically called, the *parietal* diameter; or, in other words, the side-by-side diameter, when measured from the parts above each of the ears. The distance between the *occiput* and the forehead is called the *occipito-frontal*, or the fore-and-aft diameter, when measured from the forehead to the back of the head. The former of these measurements indicates the breadth, and the latter the length, of the head. "The fore-and-aft diameter is the longest—in nine cases out of ten, in nine hundred and ninety-nine out of a thousand, and even in a greater proportion still. Indeed, a head as broad as it is long is exceptional, even amongst the broad-headed populations. But the difference between the diameters is very varied. When it is more than *two* inches, the skull is long-headed; when less than *one*, short-headed. Then the malar (cheek) bones may be prominent; the zygoma too (the bone that can be felt through the skin to form a ridge from the cheek-bone to the ear) may make a wide curve outwards. This gives *breadth* to the face. Or the forehead may retire, which gives what is called a low facial angle. Or the upper jaw may slant forwards; in which case, the insertion of the teeth will be, *not perpendicular*, but *oblique*. This is being *prognathic*, from the prefix *pro*, forward, and *gnathos*, jaw. The opposite to this is *orthognathic*, from *orthos*, upright. A jaw may be so *prognathic* as to be almost a

In the arrangement adopted by Dr. Latham, his first group comes under the Mongolian variety, and is spread over Ladakh, Bultistan (or Little Tibet), Tibet, Nepal, Sikkim, Butan, Northern India, Arakhan, the Burmese Empire, Siam, Cambojia, Cochin-China, Tonkin, China, the Andaman Islands, Nicobar, Carnicobar, Hainan, and the Mergui Archipelago. The divisions of the group are Tibetan (or Bhot), Siamese (or Thay), Burmese, Peguan (or Mon), Cambojian, Anamitic (or Cochin-Chinese), Chinese—various tribes imperfectly distributed and described as Sub-Himalayans, Nagas, and Sifan—Mincopic (or Andaman Islanders), and Nicobarians.

The Mongolian is characterised by a short head, a broad skull, and a flat face. So decided are these features, that the conformation of his head and face is a recognised term of Ethnology. Many populations have, if not exactly the same, at least similar characteristics more or less distinct from those which mark the Mongolian.

The Mongolian.

"The most constant characters of this vast and important group lie in the structure of their numerous languages, and in the conformation of the bony parts of the head and face. In complexion there are wide differences. The colour, however, of the hair is uniformly dark. Neither is there any broad separation between the taller and the shorter tribes in respect to stature. They are more undersized than over-sized. The chief physical differences lie in the tints of the skin. * * * The lightest-coloured tribes are the natives of Cochin-China and Tonkin, who speak the Anamitic language, and who are not very widely separated from the true Chinese. These latter are tawny, or parchment-coloured; so much so, in fact, as to leave no doubt as to the character of their hue. It is yellow—yellow rather than brown—or black-yellow rather than copper-coloured; though this tinge is by no means unknown. In respect to the Anamese, it has been remarked that they wear more clothing, and expose the body less than any of the populations around them. Be it so. Yet we doubt whether this gives us the true reason for their comparative fairness. They lie between a mountain range and the sea; occupants of a district wherein no vast rivers form alluvial tracts, and where the wooded slope of the mountain-side replaces the swamps of Cambojia, Pegu, and the other countries in the same latitude. Now, the former are the conditions that most favour lightness of complexion; just as the latter determine a tendency to the colour of the Negro."

In reference to the covering of the head, there is no such thing as *black* hair. Even the hair of the Negro is only black when the light falls straight upon it. When seen in a cross light, it has a red tinge—red, reddish, or brown; more red, however, than any other hue. As the black decreases, the colour becomes chesnut, auburn, light red, sandy, flaxen, yellow, and white, so called.

The second group are the Turanians, who extend over Mongolia, Mantshuria, Siberia, Independent Tartary, Turkistan, Anatolia, Roumelia (or Turkey in Europe), parts of Bokhara, Persia, Armenia, Syria, the Crimea; Lapland, Finland, Esthonia, Livonia, the Russian government of Archangel, Olonetz, Novogorod, St. Petersburg, Iver, Yaroslav, Vologda, Permia, Viatka, Kazan, Simbirsk, Saratov, Astrakan, Caucasus, Nishnii-Novogorod, Penza, Tambov, Hungary, the Kurile Islands, Japan, and Kamskatka.

The primary divisions of these are—1st, the Mongolian stock; 2nd, the Tungusian stock; 3rd, the Turk stock; 4th, the Ugrian stock; 5th, the Peninsular stock. These five divisions constitute the great *Turanian* class, which some call *Scythian.* The proposed name is Persian. Much as the Greeks and Romans called all nations except themselves *barbarians*, the ancient Persian designated, by the name *Turan*, all those parts of Central and Northern Asia from which so many wild and formidable enemies were in the habit of descending upon the south. The ancestors of the Turks, Mongols, and Ugrians, were assuredly among them. We cannot here follow the distinctions which exist among these varieties; but must refer the reader to the larger ethnological works.

The third group is that of the Caucasian, in the circumscribed signification of the term. The physiognomy of this variety is European rather than Mongolian; whilst its language is rather Monosyllabic than European. The area occupied is the mountainous region of the Caucasus; and its divisions are—1st, the Circassians; 2nd, the Mizhdzhedzhi (Mizhejeji); 3rd, the Irôn; 4th, the Georgians; 5th, the Lesgians; 6th, the Armenians.

In physical conformation the mountaineers of the Caucasus strikingly resemble those of Persia, and the higher castes of India. It is, also, like that of the Southern Europeans rather than the Northern, Central, and Eastern Asiatics. It is, in short, Caucasian, in the rude and loose sense of the word. The populations of Georgia and Circassia had been considered as models of female beauty and manly strength, although both may have been exaggerated. Those who have lived among the Caucasians, and have had opportunities of judging of them as a whole, are not so favourable in their estimation of either the beauty of the one or the strength of the other sex. Pallas (as quoted by Prichard, in his 'Natural History of Man') writes, that the men, "especially amongst the higher classes, are mostly of a tall stature, their form being of Herculean structure. They are very *slender about the loins*, have small feet, and uncommon strength in their arms. They possess, in general, a truly Roman and martial appearance. The women are *not* uniformly Circassian beauties; but are, for the most part, well-formed, have a white skin, dark-brown hair, and regular features." He adds, "I have met with a greater number of beauties among them than in any other *unpolished* nation." Quoting from Dr. Latham, he tells us that Reineggs denies the Circassian's claim to superior beauty, saying that their claims to this quality consist of "a short leg, a small foot, and *glaring red* hair." Klaproth writes, that "they have long faces, and thin, straight noses;" and speaks of the Abyssinians, a tribe of the Circassians, as being "distinguished by narrow faces; heads compressed at the sides; by the shortness of the lower part of their faces; by prominent noses, and dark-brown hair."

The Caucasian.

Little is known of the Mizhdzhedzhi other than that their dialects cut them off from those around them. They occupy a central district equally removed from the Black and the Caspian seas, at the fountain-head of the Caucasian rivers.

The Irôn are also central, occupying the water-shed between the Terek and the Kaban in the north, and the Kur in the south, overlooking the wide valleys of Georgia, as well as coming in contact with the mountain defiles of Tshetshentsh. Their creed is an imperfect Christianity of recent origin.

The most favoured part of Georgia is the valley of the Kur; the province of Kartulinia, of which Tiflis is the principal city. A large portion of Georgia, however, consists of a rugged mountain-range, occupied by the Mingrelians, the Imeritians, and the Swani. "Finally, the descendants of the ancient Colchians, who extend along the southern shores of the Black Sea, as far as Trebizond, who are subject to the Ottoman empire rather than to Russia, who are Mahometâns rather than Christians, and who use the Arabic alphabet rather than the Kartulinian, are Georgian, as is shown by their language." The Georgians are, of all the Caucasians, the most advanced in civilisation, and the Mizhdzhedzhi the rudest.

The Lesgians occupy the most eastern parts of the Caucasus, extending from the shores of the Caspian to the Tshetshentsh and Irôn frontiers. Daghestan is their country. The prophet-warrior, Schamyl, was a Lesgian.

The Armenians lie to the south of the Caucasus, rather than occupy a portion of it, and were the first of the group to make use of an alphabet, and to be converted to Christianity. This was effected by their contiguity to Syria. They are mostly spread over the world—in Turkey, in India, and in Russia—as bankers and merchants. Geographically, their country is contiguous to Kurdistan, or the country of the Kurds, who, however, belong to the Persian stock.

The fourth group is the Persian, which is Caucasian rather than Mongol. It occupies Persia, Kurdistan, Afghanistan, Beluchistan, parts of Bokhara, the Kohistan of Cabul, and Kafristan. Its divisions are Persians, Kurds, Afghans, Beluchi, and the populations of Kafristan, Kohistan, and of Cabul, collectively called Paropamisans.

The greater prominence of feature, and the comparative narrowness of the zygomatic space, which contrasts the Caucasian with the Turanian and Monosyllabic groups, are found thoughout Persia. At the same time, the colour of the skin is darker, but not so dark as to create difficulties. Nearly all the Caucasian area is wood and mountain; the greater part of the Persian, a table-land, with an extreme temperature.

"The Kafir of Kafristan is the mountaineer of the stock in his most extreme form. His contrast is to be found in the Persian of such towns as Shiraz, Teheran, or Ispahan; also, amongst the Tajaks of Bokhara, who are of Persian blood and language, though the dominant population is Turk. Intermediate to these extremes are the Afghans (or *Patans*, whose language is called the *Pushtu*), the Kurds, and the Beluchi of Beluchistan; with whom the mountaineer character changes to that of the occupants of a sandy desert. In Mekran, and along the shore of the Indian Ocean, this desert character of the country increases, until the physical conditions become those of Arabia or Northern Africa. Kafristan lies in the water-system of the Indus; the Beluchi population extends into Sinde; Afghanistan lies along the Indian frontier."

Group fifth comprises the Indian stock, the organisation of which is referred to two types. In one the skin is dark, the face broad, the features coarse. In the other, the features are regular, the head dolikhokephalic, the skin brunette rather than black. These populations inhabit India, Ceylon, the Maldive Islands, parts of the Monosyllabic frontier, and the mountains of the southern part of Beluchistan; that is, the country of the Brahúi. "Under all and any point of view, India is the country of two ethnological influences, the analysis of them being of minute and recondite criticism—of two ethnological influences; perhaps of more than two. It is the country of castes; of the Brahminic and Bhuddhist religions; of a teaming, ingenious, and industrious, but rarely independent population. It is the country of an ancient literature, and an ancient architecture. It is the country which, whatever may have been the origin of its own civilisation, helped to civilise the majority of the countries of the Monosyllabic languages—Ava, Tibet, Siam, and (more than is generally believed) China."

The sixth is named the Oceanic group, occupying the peninsula of Malacca, Sumatra, Java, and the chain ending in Timor and Rotti; Borneo and the chain leading to the Philippines; the Philippines; the Bashi and Babyani Isles; Formosa, Celebes, and the Moluccas; the islands between Timor and New Guinea; and Madagascar. The divisions comprehended in it, are the inhabitants of the

Pelew Islands and Lord North's Isle; the Caroline and Marianne Islands; the Navigators', Society, Friendly, Marquesan, and Sandwich Islands groups; Easter Island and New Zealand; the Fije Islands; New Guinea, and the islands to the east of them, called the Louisiade Archipelago, Tanna, New Caledonia, Tasmania, and Australia. The colours of these populations vary from yellow to brown, and from brown to a darker hue, approaching black. Those parts which lie nearest the continent, and from which Oceanic diffusion first took its rise, include, along with the Malaccan peninsula, the islands of the Javanese, Celebes, Floris, Banda, Molucca, and Philippine Archipelagos—namely, Sumatra, Java, Borneo, and other islands. It commences with the parts about Sumatra and the Malaccah peninsula, and ends with the Philippines. In the sea-coast towns, and in the commercial communities, the religion is Mahometan; the greater portion of the population being known by the name of Malay.

The Malay.

The seventh group are the Americans, occupying the Aleutian Isles and North and South America. The physiognomy is pronounced modified Mongolian; the departure from the type being the most marked on the water-system of the Mississippi, and the coast of the Atlantic.

Dr. Latham is of opinion that the originals of the great American group came from North-eastern Asia. His reasons for thus making short work of a hitherto long question, lie in the recent additions made to our geographical and ethnological knowledge of the parts to the west of the Rocky Mountains—of the northern parts more especially; of Russian America, of New Caledonia, and of Oregon. Is is only recently that our knowledge of these districts has been considerably extended, more particularly in regard to their ethnology. "More than this," he says, "it is only recently that the *Far West* of the parts between the Rocky Mountains and the Atlantic has been at all carefully explored. What followed from this want of information? It followed, as a matter of course, that our notions of the so-called Red Man of America were formed upon the Indians of the Alleghany Mountains, the Mississippi, and the St. Lawrence. But these were extreme samples of the American in his state of greatest contrast to the Asiatic. No wonder, then, that the connection between them was mysterious and uncertain. If investigators doubted, the want of *data* justified them. The populations which were likely to supply the phenomena of transition were unknown or neglected." He gives other reasons for establishing the original connection between the Old and the New Worlds in a population point of view; but for their perusal, we must refer the reader to his own essay.

In treating of the larger groups of America, the Esquimaux take precedence, being eminently maritime in their habits, and occupying islands like the Aleutian Archipelago; peninsulas, like the Aliaska, or broken lines of coast, such as those which form the shores of the Arctic Sea. Even in Russian America, Greenland, and Labrador, large blocks of land as they are, it is not only along the coasts that the Esquimaux are located. They form one of the North American populations that extend from west to east across the continent, from the Pacific to the Atlantic. They, themselves, being common to two continents, the area they occupy is common to two seas.

The American Indian.

Another population is the Athabascan, which extends to the great inlet of Hudson's Bay. At Cook's Inlet, 60° north latitude, the Athabascan appears in the Pacific, and to the north of Port Nelson, or Hudson's Bay, in the Atlantic. As a general rule, the southern limit of the Esquimaux is the northern limit of the Athabascan; the extension being, in both cases, from east to west (or *vice versâ*), being *horizontal.* The Athabascans, however, extend from north to south as well as from east to west; and what is more remarkable, they have given offsets. Just as the Magyars of Hungary belong to the essentially northern stock of the Ugrians, from which, however, they are geographically separated by a wide interspace: so do certain tribes of Mexico and California—tribes on the very verge of the tropics—belong to those very Athabascans, whose true area is the inland parts of Russian America, the northern range of the Rocky Mountains, the valley of the Mackenzie river, the parts about the Great Slave Lake, and the parts about Lake Athabasca,—whence the name. Some of them lie within the Arctic Circle.

"The general distribution of the Athabascans is more important than the details. The chief tribes, however, are—the Chipewayans (or Northern Indians, so called); the Beaver Indians; the Daho-dinni; the Strong-bows, the Hare-Indians; the Dog-ribs; the Yellow-knives; the Takulli (or Carriers); the Tsikanni; the Sussi; the Loncheux; and the Kenay of Cook's Inlet, along with other minor tribes. To these we must add the outlying sections of Oregon, California, and Mexico.

"In Oregon the Athabascans consist of three small tribes, of which the first two—the Kwali-okwa and the Tlatskana—lie at the mouth of the Columbia river—one north, the other south of it. The third tribe is that of the Urukna, lying on the river so called. This is in 43° north latitude.

"In California, the Navatos and Jecorillas (wild tribes of the desert), are shown, by their language, to be Athabascan; as are some other smaller Californian tribes.

"In Mexico, some of the Apatches are Athabascan; so far south have Athabascan offsets been found.

"The extent to which the tribual organisation prevails may be seen from the following list of names:—1st, the *Tantin*, or *Talkotin*; 2nd, the *Tsilkotin*, or *Chiltokin*; 3rd, the *Naskotin*; 4th, the *Thatlistin*; 5th, the *Tsatsnotin*; 6th, the *Niclaántin*; 7th, the *Ntshaántin*; 8th, the *Natliántin*; 9th, the *Nikoghiantin*; 10th, the *Tatshiántin*; and, 11th, the *Babine Indians*.

"These are the *sub*-divisions of a single Athabascan division—the TAKULLI, of New Caledonia."

The great Algonkin class extends but little to the west of the Rocky Mountains; so that its east and west, or horizontal direction, is more limited than that of the Esquimaux. It is, however, the largest of all the North American groups. "It subtends both the Athabascan and the Esquimaux areas: the former from the Rocky Mountains to Hudson's Bay; the latter in the southern and central parts of Labrador. Here the country of the Skoffi (or Nascopi) and Sheshatapush reaches 60° north latitude. On the south, the parts about Cape Fear, and in South Carolina (34° north latitude), is Algonkin, the occupancy of the now extinct tribe of the Pamtico. The vast area of the Algonkins surrounds and encloses that of the—

"Iroquois, suggesting the idea of encroachment, conquest, and displacement. If the Iroquois family cover less ground than the Algonkin, its historical prominence is equal, or even greater. The famous confederacy of the Five Nations was Iroquois. The once formidable Mohawks were Iroquois. Before the arrival of the Europeans, the Five Nations were dominant over their Algonkin neighbours; and after the arrival of the Europeans, the Iroquois warriors were more feared than those of the Algonkins. At one time, the head of the Algonkin confederacy was an Iroquois chieftain. The Iroquois and Algonkins exhibit, in the most typical form, the characteristics of the North American Indians, as found in the earliest descriptions; and they are the two families upon which the current notions respecting the physiognomy, habits, and moral and intellectual powers of the so called Red Race are chiefly founded. As a general rule, though not without important exceptions, the Algonkin and Iroquois classes lie to the east of the Mississippi; and their original area was the region of the forest rather than the prairie. The region of the prairie rather than the forest is the occupancy of"—

The SIOUX, who hold the valley of the Missouri; the foot of the Rocky Mountains; the Red River; the Arkansas to the south, and the greater portion of the Buffalo country; but so much has yet to be accomplished in respect to the classification of the American tribes, that the foregoing groups are anything but uniformly determined. For example, the Sioux and Iroquois should, in all probability, be subordinated to some higher denomination; and

A Sac Chief (Algonkin).

this higher denomination should probably again contain the following sections :—the

Woccons and Catambas, of Carolina; the Cherokees, Chocktas, and Creeks, of Tennessee, South Carolina, Mississippi, Louisiana, Florida, Alabama, and Georgia; besides the Cadds of Texas.

"Of these, the Cherokee is one of the few so-called savage nations which is increasing, and not decreasing in numbers. It is, also, the most industrious of all the American families; the Cherokee landholder having, in some cases, as much as 500 acres under tillage, and possessing slaves as well. Lastly, a native Cherokee has reduced the language to writing—the alphabet being syllabic."

There is another class—the Paducas, occupying an area remarkable in its formation. It stretches nearly from sea to sea, like the Athabascan and Esquimaux; but in an oblique or diagonal direction. In the territory of Oregon and the Middle Columbia, populations designated the Wihinast and Shoshoni, approach the Pacific. In Mexico and Texas, and in the Rio Grande, a population, called the Cumanch, approaches the Gulf of Mexico; the Cumanch, the Shoshoni, and the Wihinast, being equally Paduca. Other members of the class spread eastward, in the direction of the Platte and Arkansas rivers, westward into the Californian Desert.

These are the larger groups, spread over large areas in which the populations are comparatively uniform. The other populations which occupy areas moderate or small, need not here be noticed, as they would tend but little to elucidate our subject. In works especially devoted to ethnological science, they will be found treated at large.

The eighth group embraces the African stock, whose organisation is characterised by the head being rarely other than dolikhokephalic; the hair rarely straight; always, with individuals resident on their native area, black; skin dark; in certain localities attaining the *maximum* amount of blackness. In such cases the hair is crisp, and the lips thick; that is, the physiognomy is that of the Negro. The area occupied by this group is Africa, *minus* the island of Madagascar (wholly or in part), *plus* Arabia and portions of Syria and Persia.

"The Aramæans, or populations speaking languages allied to the Arabic and the Hebrew, and called Semitic—the Arabians, the Syrians, the Jews, and the Ethiopians of Abyssinia, constitute this class—a class pre-eminently characterised by its early civilisation, and its monotheistic forms of belief. From the Jews, Judaism; and out of Judaism, Christianity; from the Arabs, Mahometanism has arisen; whilst the alphabet was either invented or promulgated by the Phœnicians. With the Jew the face is massive. With the Arab of Arabia, in his most (so-called) Caucasian form, the face is oval; forehead vaulted; nose straight, or aquiline; lips thin; even when thick, not projecting. Hair wavy, or curled; complexion, various shades of brown; limbs spare. With the Arab of Africa, the colour is sometimes nearly black; the frame more massive, and limbs fleshy.

"The only civilisation of the valley of the Nile consisted of the ancestors of the present Copts, who are still to be distinguished from the dominant population of Egypt, which is Arab. The physiognomy of the Copt—the modern representative of the Egyptian of the Pharaonic epoch, as opposed to the Arab—is marked by black, crisp, or curled hair; projecting cheek-bones; thick lips; a nose somewhat depressed; wide nostrils; a complexion varying from a yellowish to a dark-brown; oblique eyes; a tall and fleshy frame; and the physiognomy, on the whole, heavy and inexpressive.

"The Amazrig group contains the *native* populations of the Desert of the Sahara, of the greater part of the country to the north thereof, and of the Canary Islands. Hence it occurs in the oasis of Siwah, near the Egyptian frontier, in Fezzan, Tunis, Algeria, and Morocco. The descent of the Amazrig is from the ancient Gertulians, Numidians, and Mauritanians; their chief divisions—the Ammonians (Siwah being the ancient Ammonium), the Kabails of the range of Mount Atlas, the Tuariks (of the Sahara), and the Guanches. This last was the name of the aborigines of the Canary Isles, now extinct."—These populations have always receded before others more encroaching than themselves, at least on their northern frontier, as before the *Phœnicians*, Greeks, and Mahometan Arabs. Their tongues are often called *Berber*, from the extent to which they are allied to the Hebrew and Arabic. They have, also, been called *sub*-Semitic.

The Nilotic group is one, amongst others, which connects the so-called Semitic and the *sub*-Semitic classes with the true African. The Egyptians form a separate group, as also do the Aramæans. According to Latham, the divisions of the Nilotic class are—1. The Ilmorma (Galla), Somnali, and Afer (Danakil), pastoral tribes to the south, east, and west of Abyssinia. The colour varies from a deep black to a brownish yellow. The stature is tall; the bodies spare, wiry, and muscular; the frontal profile vaulted; the nose often straight. or even arched; the lips moderate, and the hair often hanging over the neck in long twisted plaits. 2. The Agows; probably the aborigines of Western Abyssinia, encroached upon by the Ethiopians occupying the provinces of Damot, Laste, and the parts about Lake Dembea. 3. The Nubians of Nubia and Dongola; that is, of the valley of the Nile, between Egypt and Abyssinia. "A long, oval countenance," writes Rüppell, "beautifully curved nose, somewhat rounded towards the top; proportionately thick lips, but not protruding excessively; a retreating chin; scanty beard; lively eyes; strongly frizzled (but never woolly) hair; remarkably beautiful figures, generally of middle size, and a brown colour, are the characteristics of a genuine Dongolani." 4. The Bishari of the desert and mountains between the Nile and the Red Sea These are, probably, either Egyptian or Nubian; so that the class is provisional.

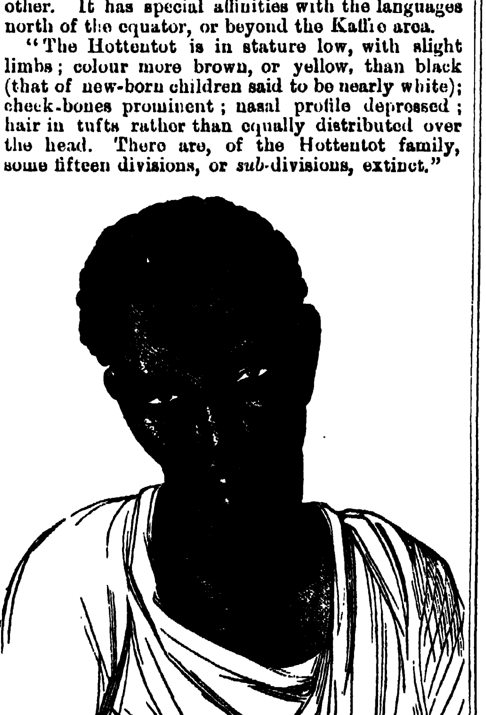
"The Galla and Somnali of the parts south of Abyssinia, lead us to the great—

"KAFFRE FAMILY, which, like the Amazrigs, extend over a vast space, from east to west. Indeed, they stretch all across the continent. The coast of Zanzibar; the valley of the Gaboon river, and the parts north of Angola and Soango, are Kaffre. Southwards, the frontier of the Cape Colony is Kaffre. Hence the Kaffre area extends from the Cape to the equator, and on both sides of Africa. From this, however, must be subtracted the area of the—

"HOTTENTOT FAMILY, which occupies a large district of undetermined magnitude, south of Benzuela. How far it extends into the interior is uncertain; but its southern limit is Cape Agulhas, the most southern promontory of Africa. The parts east of Walvisch Bay; of Angra Peguena, and the drainage of the Orange river, are all Hottentot. So is the great Kalahari Desert.

"The Hottentot," says Dr. Latham, "has a better claim to be considered as forming a second species of the *genus homo* than any other section of mankind. It can be shown, however, that the language is not more different from the languages *of the world in general, than they are from each* other. It has special affinities with the languages north of the equator, or beyond the Kaffre area.

"The Hottentot is in stature low, with slight limbs; colour more brown, or yellow, than black (that of new-born children said to be nearly white); cheek-bones prominent; nasal profile depressed; hair in tufts rather than equally distributed over the head. There are, of the Hottentot family, some fifteen divisions, or *sub*-divisions, extinct."



The Negro.

We now come to the area which is bounded by the southern frontier of the Great Desert, or Sahara, on the north; by the equator, or thereabouts, on the south; by the Atlantic on the west; and by the water-system of the Nile, or thereabouts, on the east. This is the region in which the greatest number of Negroes are to be found.

"*All the intertropic groups of Africa give us Negroes, and every Negro group gives us some brown rather than black divisions.*" Dr. Latham laconically describes a Negro as an intertropical African in a humid alluvial locality.

The European, with a Caucasian physiognomy, forms the ninth group, occupying Western, Central, and Southern Europe. Its divisions comprise—1st, the Basks; 2nd, the Skipitar; 3rd, the Kelts, or Celts; 4th, the Greeks and Latins; 5th, the Sarmatians; 6th, the Germans.

The most undetermined of the European divisions are the Basks, inhabiting the Spanish province of Biscay, and the more mountainous parts of Tuscany and Navarre. Their language has a similar relation to the Spanish and Portuguese that the Welsh has to the English. It is the remains of the ancient language of the whole country. In both Spain and Portugal, however, the blood of the populations is more Bask than the speech; the affinities of the latter being with the Latins, the effect of the Roman invasion of *Hispania.*

The Skipitars comprise the populations of Albani. This is their native name, and their place in ethnological science has also yet to be satisfactorily determined.

The Kelts, or Celts, speaking the Gaelic, occupy a portion of Ireland, the Highlands of Scotland, and the Isle of Man. The British branch occupy Wales and Brittany. In England, the blood is, more or less, Keltic, with Anglo-Saxon modifications. In France, it is Keltic with Roman. The language, in the former case, is German—in the latter, Latin—in respect to its affinities. In both, the blood is probably more Keltic than the speech.

The populations speaking the Greek and Latin languages, and the languages therefrom derived, are the ancient Romans, and the other populations of Central Italy. The language of this branch was extended, by the Romans, over Gaul, the Spanish peninsula, the Grisons, and the Danubian Principalities. In these countries the language is more Roman than the blood.

The Hellenic branch comprises the ancient and modern Greeks; both with a large amount of mixed blood.

The Sarmatian stock falls into two divisions: the Lithuanian and the Slavonic; the former occupying Lithuania and Courland, with parts of Livonia and East Prussia; the latter occupying Russia, Poland, Gallicia, part of Lusatia, Bohemia, Moravia, part of Hungary, Servia, and Illyria. In Poland and Bohemia the stock is, probably, the purest. In Russia there is a considerable amount of Ugrian; in Bulgaria, Turkish; in Germany, German, intermixture.

The Germans include all the populations whose language is related to the German. In detail, it comprises the populations of Germany, Holland, England (and, by extension, the United States, Canada, Australia, &c.), Denmark, Norway, Sweden, the Feroe Isles, and Iceland. The Dutch province of Friesland gives us the German stock in the greatest purity—that is, freedom from foreign intermixture. Eastward, it becomes, more or less, Slavonic; westward, more or less Keltic.

"With the group to which the Germans, the Sarmatians, the Greeks, and Latins belong," says Dr. Latham, "ends the classification of the 'varieties of the human species,' the main object of the science of ethnology (a science whose origin, to a certain extent, is twofold). It began with the zoologists; and it also began with the investigators of language—each looking at it exclusively from his own point of view. Thus both the *System of Nature* of Linnæus, and the *Natural History* of Buffon (works of pure and special zoology), take cognizance of man—of *man as an animal.* And they take cognizance of him in two ways—first, in respect to his relation to the inferior animals; secondly, in respect to the different *varieties of the human species.* This distinction grows clearer as we proceed; and by the time we approach the epoch of Blumenbach and Cuvier, the whole of the scientific nomenclature shows its reality and importance. Blumenbach, for instance, divides mankind into the Mongolian, the Caucasian, the American, the African, and Malay varieties; and these he considers in their relation to each other, without much troubling himself as to the characteristics by which they were each and all distinguished from the higher apes. Cuvier, on the other hand, after throwing the apes and monkeys into one order, Quadrumana (*four*-handed), falling into *genera* and *species*, makes man the representative of another—Bimana (*two*-handed); of which there is but a single *species* of a single *genus;* though upon this point other naturalists have thought differently. Now, the erect posture, the greater volume of the brain, the faculty of speech, with its corresponding organisation, the perfect mechanism of the hand, &c.—characteristics that all the Bimana have in common with each other—are, at the same time, characteristics which distinguish them from the Quadrumana."

FELIDÆ.

In this family group, are included the lions, the tiger, the leopard, the lynx, the cat, and many others. It scarcely admits of any subdivision, and in it are comprehended the most sanguinary, the most formidable, and the most typical of the order *Carnivora*. That is to say, in these animals the organs of destruction exhibit the highest degree of development. Among quadrupeds they are what the eagles and falcons are among birds.

Essentially carnivorous, still, unlike the dog which relishes carrion, they reject putrescent flesh, and consequently are more expressly endowed and fitted for the work of wholesale slaughter. Their instincts and powers are, in fact, in admirable accordance. Their frame is vigorous, but agile,—their limbs are short, the joints well-knit, but supple, and every motion is easy, free, and graceful. They leap and bound with astonishing velocity. Their footfall is silent, the feet being provided with elastic pads; namely, a large basal ball or cushion, and one under each toe (see Fig. 5). The claws are of enormous size, hooked, and sharp, and when not in use completely retracted within a sheath, so as not to be visible. These, indeed, and the teeth, are the instruments of their destructive energy.

The dentition of the Felidæ is very characteristic. The incisors are very small, six above and six below. The canines are of enormous size and strength; the false molars are sharp and compressed; above there are two on each side,—the first small, the second long and conical. This is followed by the laniary molar (carnassière), which is bicuspid with an inner blunt tubercle; behind the laniary is a very minute tuberculous molar, but this is wanting in the lower jaw, and the laniary is bicuspid.

Dental formula.—(See Figures 10, 11, 12.)

$$\text{Incisors } \frac{6}{6}, \text{ canines } \frac{1-1}{1-1}, \text{ molars } \frac{4-4}{3-3}.$$

The shortness of the muzzle and the boldness of the occipital ridge give an appearance to the skulls of the Felidæ as if they were drawn out backwards; the forehead has no sudden rise, but is continued from the nasal bones to the occiput, in a gradual arch. The union of the interparietal and occipital ridges forms a beetling promontory (to which is attached the ligamentum nuchæ), overhanging the occipital bone, which has a perpendicular, and even inwardly inclined, direction; so that the back of the skull appears abruptly truncate. The orbits are large, of a somewhat oval form, and obliquely situated. The outer ring is incomplete, excepting, as far as we ourselves have examined, in one species, the *Felis planiceps* of Sumatra, in which, as in the ichneumons, it is a fair circular ring; indeed, the skull of this species (of which we have only seen a single specimen) we considered as approaching in its contour to that of some of the viverræ. The tympanic bulla, enclosing the internal organs of hearing, is largely developed. In the *Felis planiceps* it is of peculiar magnitude.

The bold ridges, and the strength and form of the zygomatic arches, indicate the immense volume and stress of the muscles destined to act upon the lower jaw. The articulating condyles are not raised above the straight horizontal line carried along the sides of the lower jaw; they are cylindrical, and firmly locked in the transversely elongated glenoïd cavities, the margins of which are so elevated before and behind as to render any but a simple hinge-like motion impossible. This scissor-like action of the lower jaw is in accordance with the trenchant character of the molar teeth, the mutual action of which on each other resembles that of the blades of a pair of shears. (See Figures 2, 3, 4.)

The skulls of the *Felidæ* exhibit a general sameness of contour; the principal difference being that of size, according to the species. The ocelot has, perhaps, the most rounded skull, while that of the *Felis planiceps* is flattened between the orbits, and narrow. Those of the lion and tiger are very similar, and not easy to be discriminated from each other. There is greater straightness in the longitudinal outline of the upper surface in that of the lion; greater flatness of the space between the orbits; and the infra-orbital foramina are larger and often double. The following character, first noticed by Professor Owen, appears to be an unfailing criterion. In the tiger, the nasal processes of the maxillary bones never extend upwards as far as the union of the nasal bones with the frontal, failing by the third of an inch; while in the lion, the nasal processes of the maxillary bones always attain the line of union between the nasal and frontal bones, and sometimes even pass beyond it.

In the limbs of the Felidæ we behold the finest display of muscular development which can be conceived. The dissected arm of a lion or tiger is a subject worthy the study of an artist. Hence to dash down their prey is an easy task. It has been said that the Bengal tiger has been known to fracture the skull of a man with one stroke of its heavy paw. We may easily conceive the force of the muscles destined to act on the claws or talons to which we have already alluded. There are five toes on the anterior, and four on the posterior extremities; and these are armed with the formidable weapons in question. By a beautiful structural conformation of the bones, ligaments, and muscular parts, they are always preserved without effort from coming in contact with the ground, and are retracted within a sheath, so as to be kept sharp and ready for service.

This involuntary retraction, counteracted only by the action of muscles, is effected by two elastic ligaments, so contrived as to roll back the ultimate phalanx which the claw encases, and bring it down by the outer side of the penultimate phalanx, which is flattened off to remove every obstruction. From this position the talon can be thrown forward in a moment, the action of the double elastic spring being counteracted by that of the flexor muscles. In the act of striking with great violence, the flexor muscles strongly contract, brace up the tendon, and throw out the talon, which, when the act is over, returns to its sheath. An analogous arrangement exists in the claws of the sloth. Its hooks, as they may be termed, are governed by an elastic ligament, but its tendency, contrary to what we see in the cat tribe, is to press them towards the palm, in order to enable the animal to cling without fatigue to the branches from which it suspends itself. In Figure 7, which is a toe from the left foot of a young lion represented in a state of extension, *a* points to the two elastic ligaments; *b* the tendon of the extensor muscle; *c* a slip of inelastic tendon; *d* the tendon of the flexor muscle, which passes over the upper extremity of the last phalanx at *e*, as over a pulley, and thus assists the powerful action of that muscle.

In Figure 6, a toe from the hind foot, the two elastic ligaments (*a*) converge to be inserted into the upper angle of the last phalanx, and draw it backwards upon, instead of by the side of, the penultimate phalanx. *c* is a slip of the lateral inelastic tendon, and *d* the tendon of the flexor profundus, which is strongly strapped down by an annular ligament *e*.

Figures 8 and 9 are also illustrative of the mechanism described.

Figure 9 *a* and *b*, the extremities of the two bones of the fore-arm; *c c* the carpal or wrist bones; *d d* the metacarpal bones; *e e* the first row of phalangal bones; *f f* the second row of phalangal bones; *g g* the last row encased with the claws.

Figure 8, *a*, second phalanx of a toe; *b* the last phalangal bone; *c*, an elastic ligament.

The general skeleton of the Felidæ, as exemplified by that of the lion (figure 1), will claim a moment's notice.

The back and loins are long; the vertebræ of the neck are remarkably large and solid, the first or atlas having its lateral processes flat and expanded; the spinous processes of the dorsal vertebræ are long, with the exception of the last two or three; the transverse processes of the lumbar vertebræ are large; the spinous processes are broad, but rather short, and inclined gently forwards, but become, as they advance to those of the dorsal vertebræ, more upright, while, on the other hand, those of the dorsal in descending lose their obliquity; the chest is deep; the scapula is broad, with a high strong spine; the clavicle is small, and merely imbedded in the muscles of the shoulder; the humerus is short and stout; it is remarkable for a high ridge or crest, which rises above the outer condyle of its lower articulation. Above the inner condyle there is an orifice for the passage of the artery, which does not run round the bone, but, as it were, pierces it in a direct course onwards. This orifice is found not only in all the Felidæ, but in some of the American monkeys, in the seals, the badgers, the coatis, the racoons, the mustelæ, the civets, the ichneumons, and others, but not in the dog, the hyæna, or the bear.

With respect to the perfection of the senses in the Felidæ, a few words may be necessary.

Sight.—The sense of sight is very acute, and adapted not only for diurnal, but also for nocturnal vision. The eyes are placed obliquely, and glare in the dark, owing to the brilliancy of the tapetum lucidum, a concave mirror at the bottom of the eye.

This glare is visible even during the day, especially when the animals are enraged, for the pupil dilates under excitement. In the smaller cats the pupil is vertically linear when contracted, but in the larger, as the lion, tiger, leopard, cheetah, jaguar, &c., it is circular.

Hearing.—The sense of hearing is exquisite, and the auditory apparatus is accordingly developed. We have already noticed the magnitude of the tympanic bulla.

Smell.—This sense is also in great perfection, and the olfactory apparatus is complicated, and abundantly supplied with nerves. The Felidæ are, however, less distinguished for the sense of smell than the canine race.

Taste.—The sense of taste is not very refined. The tongue is rough. The roughness of the tongue of the common cat is familiar to every one, as well as the action of lions and tigers in licking the bones of their prey in order to scrape off the adherent particles of flesh. This is effected by numerous horny papillæ, differently arranged in different species, but always with the points directed backwards. Figure 15 shows these papillæ on the lion's tongue; and Figure 14, a magnified view of them on a small portion.

Feeling.—The long bristles called *whiskers* on each side of a cat's mouth are familiar to all: these are important organs of touch. They are attached to a bed of close glands under the skin, and each is connected with a nerve. Hence they communicate to the animal an impression from the slightest touch. If we imagine a lion or tiger stealing through a jungle during the darkness of night, we shall be able to account for the use of these whiskers. They indicate to him, through the nicest feeling, any obstacle which may present itself in his progress; they prevent him from rustling the leaves or boughs, and alarming his prey; and they thus, in conjunction with the soft springy pads of his feet, which render his steps noiseless, enable him to steal upon his unsuspecting victim, and make his fatal bound.

16—26. THE LION.

Λέων (*Leon*) of the Greeks (Λέαινα (*Leæna*) lioness); *Leo* of the Latins (*Lea* and *Leæna*, lioness); *Leone* of the Italians (*Leonessa*, lioness); *Leon*, Spanish; *Lion*, French (*Lionne*, lioness; *Linceau*, cub); *Löwe*, German (*Löwinn*, lioness); *Felis Leo*, Linn. Male, as a general rule, ornamented with a mane, of which the female is destitute.

The stern dignity of the lion, his enormous strength, his glowing eyes, his deep roar, and his destructive powers, all combine to render this terror of the desert one of the most attractive objects of a menagerie. The lion is now limited to Africa and certain parts of Asia; but formerly it was more extensively spread, the eastern line of Europe being within its boundaries. Herodotus informs us that the camels which carried the baggage of the army of Xerxes were attacked by them in the district of the Pæonians and Crestonæi, on their march from Acanthus to Therme (afterwards Thessalonia, now Saloniki): he adds also that these animals were numerous in the mountains between the rivers Nestus, in Thrace, and the Achelous, which flows through Acarnania. Aristotle gives the same locality as the abode of lions, and the same fact is repeated by Pliny, who says, "Longè viridibus præstantiores iis quos Africa aut Lybia gignunt,"—"They far exceed in strength those produced in Africa or Lybia." Pausanias, alluding to the disasters which befel the baggage-camels of Xerxes, states that the lions often descended to the plain at the foot of Olympus, between Macedonia and Thessaly.

Lions were common in Syria, as we gather from numerous passages in the sacred records. Oppian states that Armenia and Parthia produced a formidable breed. At present the lion is confined to the interior wilds of Africa, to some of the districts of Arabia and Persia, to the country bordering the Euphrates, and to some parts of India. We hesitate not to say, that throughout the whole of this range the lions are specifically identical, although different breeds may be distinguished. Of the African lions the Barbary breed is characterised by having a deep yellowish-brown fur, and the mane of the male is much developed (Fig. 17).

The Senegal lion has the fur of a more yellow tint, the mane is less full, and nearly wanting upon the breast and insides of the fore-legs.

The Cape lion presents two varieties, one yellowish, the other brown, the mane of the latter often deepening almost to black. The dark lion is said to be the most ferocious (*Fig.* 22).

Of the Asiatic breeds the Bengal lion has the mane magnificently developed, the colour of the fur of a dark yellowish-brown (Fig. 18). It attains to a very large size. The Persian or Arabian lion is said to be characterised by the pale Isabella colour of the fur (*Fig.* 19).

Within the last few years, a maneless, or nearly maneless, breed has been discovered in Guzerat. Pliny alludes to a maneless lion which he regarded as a hybrid occurring in Africa.

It is to Captain Smee that we owe our knowledge of the maneless lion. On his return from Guzerat to England he brought several skins of such lions which he himself had shot; some of these he presented to the Zoological Society of London, and communicated an interesting paper to the 'Zoological Transactions' on the subject. The maneless lion of Guzerat differs from its Bengal, Persian, and African relatives, not only in the absence of a full mane, but also in being rather lower on the limbs, and in having a somewhat shorter tail, furnished at its tip with a larger brush. The colour is pale fulvous. A male killed by Captain Smee measured, including the tail, eight feet nine and a-half inches; his weight, exclusive of the internal viscera, was thirty-five stone (fourteen pounds to the stone); his height three feet six inches; and the impression of his paw on the sand measured six and a-half inches across (Fig. 20).

It is along the banks of the Sombermuttee, near Ahmedabad, according to Captain Smee, that this variety of the lion is found: it occurs also on the Rhun, near Rhunpor, and near Puttun in Guzerat. During the hot months they inhabit the low brushy wooded plains that skirt the Bhardar and Sombermuttee rivers from Ahmedabad to the borders of Cutch, being driven out of the large adjoining tracts of high jungle called Bheers, by the practice annually resorted to by the natives, of setting fire to the grass in order to clear it and ensure a succession of young shoots for the cattle upon the first fall of the rains. So numerous are they that Captain Smee killed in one district eleven in the course of a month. They make terrible havoc among the cattle, and when attacked exhibit great boldness. The native name for this lion is *Ontiah Baug*, or camel-tiger, an appellation from the resemblance in colour to the camel.

The habits and manners of the lion have been detailed by various travellers, and no one can doubt its strength, its daring, and ferocity. Near the precincts of colonization in Southern Africa and elsewhere, where firearms are in use, it has learned by experience their fatal effects, and gained a consciousness that its powers avail but little against such weapons of destruction.

The king of the forest is a term misapplied to this noble beast; forests are not its haunts, but burning desert plains and wide karroos covered only with shrubby vegetation, or interspersed with tracts of low brushwood. In India it frequents the jungles and the luxuriant borders of rivers, among which it makes its lair.

During the day the lion usually slumbers in his retreat; as night sets in he rouses from his lair and begins his prowl. The nocturnal tempests of rain and lightning, which in Southern Africa are of common occurrence, are to him seasons of joy: his voice mingles with the roar of the thunder, and adds to the confusion and terror of the timid beasts upon which he preys, and upon which he now advances with less caution and a bolder step. In general, however, he waits in ambush or creeps insidiously towards his victim, which with a bound and a roar he dashes to the earth.

Of the strength of the lion we have most extraordinary examples on record. To carry off a man —and this has but too often happened—is a feat of no difficulty to this powerful brute. Indeed, when we find that a Cape lion seized a heifer in his mouth, and, though the legs dragged upon the ground, carried her off with apparently the same ease as a cat does a rat, leaping a broad dyke with her without the least difficulty—that another, and a young one too, conveyed a horse about a mile from the spot where he had killed it—that a third, which had carried off a two-year-old heifer, was followed on the track for five hours by horsemen, who observed that throughout the whole distance the carcass of the heifer had only once or twice touched the ground,—we may conceive that a man would be an insignificant burden. Such a powerful animal, however, we must not expect to see in the confined dens of a menagerie: there their limbs become cramped, their muscular system undeveloped, their bones often distorted, and their daring and ferocity subdued. Such a shadow of a lion the Figure 26 exhibits, taken from an individual three years old, which had been pent up in a wretched cage.

The Indian lion displays the same courage as its African relative. Instead of retreating on the hunters' approach, he stands his ground or rushes to meet them open-mouthed on the plain. Lions are thus easily shot; but if they be missed or only slightly wounded, they prove very formidable. They will spring on the heads of the largest elephants, and have, it is asserted, often pulled them to the earth, riders and all.

In the defence of her cubs the lioness is resolute in the extreme, and is doubly savage during the time they remain under her care. Her mate participates in her feelings. The lioness goes with young five months, and generally produces from two to four at a birth. They are born blind. For several months their fur is obscurely striped or brindled, the markings reminding us of those of the tiger: these stripes branch off from a blackish line running down the middle of the back. Their voice has a cat-like mew. Gradually the uniform colour is assumed, and at about the end of twelve months the mane begins to appear: this increases, and the voice deepens into a roar.

The lion attains to maturity about the fifth year: its term of life is of considerable extent. Pompey, which died in the Tower in 1760, had been there for seventy years; and one from the Gambia died there at the age of sixty-three. Figure 16 is a fine representation of a time-worn lion stretched out in the act of expiring. Imagination pictures such a one in the solitary desert: age has overtaken him, his eye is dim, his force abated, he fails in his once fatal spring; gaunt, and lean, and feeble, he drags his weary limbs to the old haunt,—the haunt from which he once went forth in the pride of his strength, when his voice scattered terror through the desert,—there at length to die. Better had he fallen by the hunter's javelin, when 'his limbs were strong and his courage high,' than thus drain to the dregs a miserable existence.

It has long been a popular belief that the lion lashes himself with his tail to stimulate himself into a rage: and though such a use for it is out of the question, a sort of claw or prickle has been detected at the termination of that organ. Mr. Bennett detected it in the tip of the tail of a young Barbary lion. Blumenbach had previously ascertained the fact of its existence in a specimen examined by himself in 1829. M. Deshayes announced the existence of this prickle in a lion and lioness which died in Paris menagerie. Mr. Wood detected it only once out of numerous lions which he purposely examined; he also found a similar prickle on the tip of the tail of an Asiatic leopard.

This prickle is in fact only occasionally present; it is not connected with the caudal vertebræ, but, as Mr. Wood states, appears to be inserted into the skin like the bulb of a bristle; but M. Deshayes asserts that it is of a conical shape, and adheres to the skin by its base; as does also Blumenbach. (See Fig. 13.) We are much inclined to think it nothing more than an indurated and partially detached cuticle; certainly it falls off with the slightest touch.

Hybrids between the lion and tigress (Fig. 27) have occurred in our country. One litter was produced in 1827 in Atkin's menagerie, and another litter subsequently from similar parents was produced at Windsor. In both cases the hybrids died before arriving at maturity. Their colour was brighter than that of true lion-cubs, and the bands more defined and darker.

Excepting in the vast wilds of Central Africa, untrodden by the foot of the white man, the lion, even in the regions to which it is at present restricted, is much more rare than formerly. The ancient Romans procured incredible multitudes for the arena: Scylla brought a hundred males at once into the combat; Pompey gave six hundred, of which more than half were males; Cæsar four hundred; nor was it until the time of the later emperors that any difficulty in procuring them began to be experienced.

There are few travellers in Africa who have not been under the necessity of encountering this formidable beast; and many are the exciting narratives which have been related, of the incidents of the chase—of escape from almost certain death—of triumph over the foe.

The bushmen of Southern Africa, according to Dr. Philip, are in the habit of insidiously attacking the slumbering lion with their poisoned arrows. They have remarked that he generally kills and devours his prey in the morning at sunrise, or in the evening at sunset; and that he sleeps during the heat of the day so profoundly as with difficulty to be awakened; and that when roused he seems to lose all presence of mind. Marking the spot where a lion is supposed to have taken up his quarters for sleep, they cautiously advance, and silently lodge a poisoned arrow in his breast. The lion, thus struck, springs from his lair, and bounds off; but the work is done, and the bushmen follow his track, knowing that in a few hours, or less, he will expire.

As a general rule, the lion is ornamented with a mane of which the female is entirely destitute. What are considered as the true lions, belong exclusively to the Old World, where, in former times, they were both widely and abundantly diffused; but with the advancement of man into their haunts, their range has, every year, become more and more circumscribed, until they are now only to be found in Asia and Africa. They no longer exist in Europe, a part of which, there is no doubt, they once inhabited; nor are they now to be found in Egypt, Palestine, or Syria. Even in India and Persia, and some districts of Arabia, they have become comparatively rare; while the African lion is gradually retiring further and further from the Cape, thus acknowledging his incapability of disputing the ground of his native habitat with the superior intelligence of man. Mr. Bennett, formerly of the Tower menagerie, observes, that "the true country of the lion is Africa, in the vast and untrodden wilds of which, from the immense deserts of the north to the trackless forests of the south, he reigns supreme and uncontrolled. In the sandy deserts of Arabia, in the wild districts of Persia, and the vast jungles of Hindostan, he still maintains a precarious footing; but from the classic soil of Greece, as well as from the whole of Asia Minor, both of which were once exposed to his ravages, he has been utterly dislodged and extirpated."

The distinguishing features of the lion are its uniform yellow colour, the tuft of hair at the end of the tail, and the mane covering the head and shoulders. Of this animal there are several varieties, such as those of Barbary and Senegal, besides the lion of the Cape. Even of this there are two varieties, one yellowish, and the other brown; the latter being regarded as the fiercest and most formidable. There are, also, a blue and a black kind, of which the Dutch colonists make mention. Mr. Pennant, in the third edition of his 'History of Quadrupeds,' describes the lion as an inhabitant of most parts of Africa, and rarely of the hot parts of Asia, such as Persia and India; and a few are still met with in the deserts of Bagdad and Bassorah, on the banks of the Euphrates. Niebuhr likewise places them among the animals of Arabia; but their proper country is Africa, where their size is the largest, their numbers greatest, and their rage more tremendeus, being inflamed by the influence of a burning sun upon a most arid soil. Dr. Fryer says, "that those of India are feeble and cowardly. In the interior parts, amidst the scorched and desolate deserts of Zaara or Biledulgerid, they reign sole masters; they lord it over every beast, and their courage never meets with a check, where the climate keeps mankind at a distance: the nearer they approach the human race, the less their rage, or rather the greater their timidity. They have often experienced the unequal combat; and finding that there exists a being superior to them, commit their ravages with more caution: a cooler climate, again, has the same effect; but in the burning deserts, where rivers and fountains are denied, they live in a perpetual fever—a sort of madness, fatal to every animal with which they meet."

As the present writer has ridden on the back of an elephant, so has he on that of an African lion. This was the foolhardy feat of a boy of fourteen years of age, when, for a sixpence, he was allowed to enter the den of a huge animal called Nero, upon the back of which he soon perched himself, notwithstanding the ominous growl, and the wide sweep of the tail with which the daring act was accompanied. The animal, however, was very tame; indeed, so tame, that he would not encounter some half-dozen, if we remember rightly, English mastiffs that were matched against him. But lions are easily tamed, and exemplify a considerable degree of attachment to man. Almost every wild-beast show has its tame lion, with which the keeper astonishes the multitude, from the liberties he takes with it.

The general prey of the African lion consists of the largest quadrupedal herbivora, few of which have the power to combat with it, or to escape from the deadly effects of its terrible spring. The bullocks of the farmer frequently become the victims of its power; so that their owner is generally possessed of a good gun, in the use of which he is usually so well practised, as to rarely miss his aim when brought within range of the foe of his herds and flocks. It appears that, when the lion is roused, it walks off quietly, at first, with a sort of hesitating, uncertain step; and if there be no cover near, and not pursued, it gradually increases its speed to a trot, till it has reached a secure distance, when it bounds away. Upon such occasions its demeanour is described as of a careless description, as if it did not want to fight, although, if unduly pressed, was quite ready for the combat. When pursued closely, it turns, and couches, generally with its face to its adversary, which is the moment of trial to the nerves of the sportsman. If he be sufficiently cool and skilful in the use of his arm, the rifle ends the fray at once; but if, in the flutter of the unexpected turn of the lion, he miss a vital part, or the ball whizzes past, leaving the animal unscathed, he often charges his foe, and, in his excited fury, takes a terrible vengeance. Even then, however, hunters sometimes save themselves by collecting resolution to make a stand in the face of the beast. An instance of this kind is related by Sparrman. Jacob Kok, of Zee-koe-rivier, was one day peregrinating his fields with his loaded gun in his hand, when he accidentally fell-in with a lion. He was an excellent shot, and was pretty certain of prostrating his foe, from the position in which he was placed, and so took aim and fired. The charge in his piece, however, had been there for some time, and being damp, did not immediately take fire, but hung; and the ball falling short, entered the ground near to the lion. In consequence of this, he was seized with a panic, and setting off with his utmost speed, was closely pursued by the lion, until he came to a heap of stones, where, finding himself out of breath, he took the resolution of making a stand. Taking his position on the apex of the stone-heap, he presented the butt-end of his gun to his antagonist, resolved to fight it out to the last. This movement, however, produced such an impression on the lion, that he, also, made a sudden stand; and, by-and-by, with the utmost apparent unconcern, deliberately lay down at the distance of only a few yards from Jacob. He, in the meantime, stood fixed to the spot, not stirring an inch; and as, in his flight, he had dropped his powder-horn, he had not the means of reloading his rifle. At length, after a full half-hour, the lion rose, and, at a very slow pace, made a movement as if it were his desire to steal away. This he continued until he reached some distance, when he increased his pace, until it ended in his usual magnificent bounds when hastening to the cover of the forest. In the 'Travels of Lichtenstein,' the following thrilling incident is related:—"When passing near the Riet river-gate, and while our oxen were grazing, Van Wyk, a colonist, stopped and said, 'It is now more than two years since, in the very place we now stand, I ventured to take one of the most daring shots that ever was hazarded. My wife was sitting within the house, near the door; the children were playing about her, and I was without, near the house, busied in doing something to a waggon; when suddenly, though it was mid-day, an enormous lion appeared, came up and laid himself quietly down in the shade, upon the very threshold of the door. My wife, either frozen with fear, or aware of the danger attending any attempt to flee, remained motionless in her place, while the children took refuge in her lap. The cry they uttered attracted my attention, and I hastened towards the door; but my astonishment may well be conceived when I found the entrance to it barred in such a way. Although the animal had not seen me, unarmed as I was, escape seemed impossible; yet I glided gently, scarcely knowing what I meant to do, to the side of my house, up to the window of my chamber, where I knew my loaded gun was standing. By a most happy chance, I had set it in the corner, close by the window, so that I could reach it with my hand; for, as you may perceive, the opening is too small to admit of my having got in; and, still more fortunately, the door of the room was open, so that I could see the whole danger of the scene. The lion was beginning to move, perhaps with the intention of making a spring. There was no longer any time to think; I called softly to the mother not to be alarmed; and invoking the name of the Lord, fired my piece! The ball passed directly over the hair of my boy's head, and lodged in the forehead of the lion, immediately over his eyes, which shot forth, as it were, sparks of fire, and stretched him on the ground, so that he never stirred more. My relief may be easily imagined.'"

Size for size, the lion is among the strongest of all animals. The diminutive mole, perhaps, surpasses it in the point of sheer strength; but, comparatively, its activity immeasurably outreaches that creature. Besides, the physical power of the mole is concentrated in its fore-quarters, the hind parts being feeble; whereas the power of the lion is distributed over its whole frame, giving to its movements an unrivalled easiness of grace in all its motions. This is a rare quality in an animal of such dimensions. In this respect, the ox, the hippopotamus, rhinoceros, or even the horse, cannot approach it. "There are several Hebrew words which are used for the lion: but the one which signifies the animal in its adult state, is derived from an Arabic word signifying strength; and, therefore, the lion is called the *strong one*, as the bat is called the night-flier. No epithet could be better deserved, for the lion seems to be a very incarnation of strength; and even, when dead, gives as vivid an idea of concentrated power as when it is living. And when the skin is stripped from the body, the tremendous muscular development never fails to create a sensation of awe. The muscles of the limbs, themselves so hard as to blunt the keen-edged knives employed by a dissecter, are enveloped in their glittering sheaths, playing upon each other like well-oiled machinery, and terminating in tendons, seemingly strong as steel, and nearly as impervious to the knife. Not until the skin is removed can any one form a conception of the enormously powerful muscles of the neck, which enable the lion to lift the weighty prey which it kills, and to convey it to a place of security."

In reference to the roar of the lion, Gordon Cumming tells us, that it is one of the most striking things connected with the king of beasts. It is grand in the extreme. "It consists, occasionally, of a low, deep moaning, repeated five or six times, ending in faintly audible sighs. He will often startle the forest with loud, deep-toned, solemn roars, repeated five or six times in quick succession, each increasing in loudness to the third or fourth, when his voice dies away in five or six low muffled sounds, very much resembling distant thunder. As a general rule, lions roar during the night, their sighing moans commencing as the shades of evening envelop the forest, and continuing at intervals throughout the night. In distant and secluded regions, however, I have constantly heard them roaring loudly as late as nine or ten o'clock on a bright sunny morning. In hazy and rainy weather, they are to be heard at every hour in the day, but their roar is subdued."

It would appear that there is hardly any other animal so invisible as the lion is in the dark. Almost every hunter has remarked this, informing us of the lion's approach at night, striking terror into both dogs and cattle as he draws so near as to enable his breathing to be heard, and yet his form quite invisible. "Sometimes, when he has crept near an encampment, or close to a cattle inclosure, he does not proceed any further, lest he should venture within the radius illumined by the rays of the fire. So he crouches closely to the ground, and, in the semi-darkness, looks so like a large stone, or a little hillock, that any one might pass close to it without perceiving its real nature. This gives the opportunity for which the lion has been watching, and in a moment he strikes down the careless straggler, and carries off his prey to the den. Sometimes, when very much excited, he accompanies the charge with a roar; but, as a general fact, he secures his prey in silence."

In reference to the dwelling-place of the lion, we find that this is generally chosen in the very depths of the forest, where, doubtless, he feels security from both the annoyance and the attack of other animals. "No fox knows every hedge-row, ditch, drain, and covert, better than the lion knows the whole country round his den. Each lion seems to have his peculiar district, in which only himself and his family will be found. These animals seem to parcel out the neighbourhood among themselves by a tacit law like that which the dogs of Eastern countries have imposed upon themselves, and which forbids them to go out of the district in which they were born. During the night he traverses his dominions; and, as a rule, he retires to his den as soon as the sun is fairly above the horizon. Sometimes he will lie in wait for prey in the broadest daylight; but his ordinary habits are nocturnal; and, in the day-time, he is usually asleep in his secret dwelling-place."

In the Scriptures, the lion is frequently mentioned in a manner that shows how narrowly his characteristics had been watched, and how well they were known. Many passages refer to his roar; and Mr. Wood, in his 'Bible Animals,' observes—"It is remarkable that the Hebrew language contains several words by which the different kinds of roar are described. One word, for example, represents the low, deep, thunder-like roar of the lion seeking its prey. This is the word which is used in Amos iii. 4—'Will a lion roar in the forest when he hath no prey;' and in this passage the word which is translated as lion, signifies the animal when full-grown and in the prime of life. Another word is used to signify the sudden exulting cry of the lion as it leaps upon its victim. A third is used for the angry grunt with which a lion resents any endeavour to deprive it of its prey—a sound with which we are all familiar, on a miniature scale, when we hear a cat growling over a mouse which she has just caught. The fourth term signifies the peculiar roar uttered by the young lion, after it has ceased to be a cub, and before it has attained maturity. This last term is employed in Jeremiah li. 38—'They shall *roar* together like lions; they shall *yell* as lions' whelps;' in which passage two distinct words are used, one signifying the roar of the lion when searching after prey, and the other the cry of the young lions." The great strength of the animal is a frequent subject of allusion. In the series of prophecies uttered by Jacob on his death-bed, "the power of the princely tribe of Judah is predicted under the metaphor of a lion; the beginning of its power as a lion's whelp; the fulness of its strength as an adult lion; and its matured establishment in power as the old lion that couches himself, and none dares to disturb him. Solomon, in the Proverbs, speaks of him as 'the strongest among beasts, and that turneth not away from any.'" Yet will he quit the haunts of the gorilla, and is even chary of combating the rhinoceros. In the same book, Solomon again alludes to its courage in the passage, "The wicked fleeth when no man pursueth; but the righteous are bold as a lion." In the second book of Samuel, too, the courage of Benaiah, one of the mighty three of David's army, is especially applauded, because he fought and killed a lion single-handed, and because he conquered "two lion-like men of Moab." David, their leader, had likewise distinguished himself, when nothing more than a herdsman, by slaying a lion that had attacked his herd. In the same book, brave men are frequently described as having the hearts of lions.

28.—THE TIGER.

Τίγρις (*Tigris*) of the Greeks; *Tigris* of the Latins. *Tigre Royal*, Buffon's *Nat. Hist.*; *Felis Tigris*, Linn.

The Royal Tiger, as it is often called to distinguish it from the smaller tiger-cats, is far more limited in its range than the lion. It is exclusively Asiatic. Hindostan may be considered as its head-quarters, but it is common in the larger islands, as Sumatra, where it is a fearful scourge. It is said to occur in the south of China, and also in the deserts which separate China from Siberia, and as far as the banks of the Oby. It is found in Tonquin and Siam. The ancients regarded India and Hyrcania as nurseries of the tiger. Hyrcania was a province of the ancient Persian empire, at the south-eastern corner of the Caspian Sea; but its boundaries are not very determinate. Whether the tiger still inhabits this district is not very clear; there is no reason, however, to doubt the concurrent testimonies of the ancient writers.

The tiger is equal in size to the lion, but of a more elongated form, and pre-eminently graceful. The head also is shorter and more rounded. Occasionally individuals occur exceeding any lion we have contemplated in menageries; but the average height is from three feet six inches to four feet. The general tint of the fur is of a fine yellow or reddish-yellow, ornamented by a series of transverse black bands or stripes, which occupy the sides of the head, neck, and body, and are continued on the tail in the form of rings: the under parts of the body and inner parts of the limbs are almost white. Individuals are sometimes exhibited of a very pale colour, with the stripes very obscure; and Du Halde says that the Chinese tiger (*Lou-chu* or *Lau-hau*) varies in colour, some being white, striped with black and grey.

The ancients make frequent mention of the tiger, with which it cannot be doubted that Aristotle was well acquainted, though he talks of a breed in India between this animal and the dog, meaning perhaps the cheetah, which is used for the chase. Pliny describes the "tremendous velocity" of the tiger, and the devoted attachment of the tigress to her young. Oppian speaks of swift tigers, the offspring of the zephyr; and of its swiftness, Mr. Bell, the traveller, and Père Gerbillon, were witnesses in China, the chase of this animal being a favourite diversion with the great Cam-Hi, the Chinese monarch. It appears that Augustus was the first who exhibited a tiger at Rome, which was tame, and kept in a cage. Claudius afterwards exhibited four, and Cuvier suggests that it was in commemoration of this rare spectacle that the mosaic, discovered some years since at Rome, was made, representing four royal tigers in the act of devouring their prey. As, however, India and its products became better known to the Romans, the tiger was rendered more familiar to them, but was never exhibited in great numbers. Ten were in the possession of Gordian III.

Active, powerful, and ferocious, the tiger is more to be dreaded than the lion, because it is more insidious in its attack, and also prowls abroad by day as well as by night. In some districts of India and in Sumatra its ravages are frightful. We are informed by Col. Sykes, that in the province of Khandeish alone, one thousand and thirty-two tigers were killed from the year 1825 to 1829 inclusive, according to the official returns. In Sumatra the infatuated natives seldom attempt their destruction, having a notion that they are animated by the souls of their ancestors. Tiger-hunting is one of the favourite field-sports of the East; and as the chase is not unattended with danger, it is productive of proportionate excitement. Though horsemen as well as persons on foot attend on these occasions, it is more for the sake of "being in at the death," than of taking a decided part, for the horse will seldom stand steadily when near this dreaded beast. It is to the armed riders on elephants that the dangerous work of rousing up the tiger from the jungle-covert is left, and of firing at him as he bounds along. The tiger's first object is to escape under the covert of the long grass or jungle; but, when wounded or hard pressed, he will turn with great fury, and by springing on the elephant's head or shoulder, endeavour to reach his antagonists. The agitation of the

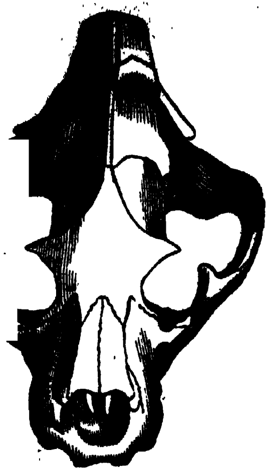


Fig. 2.

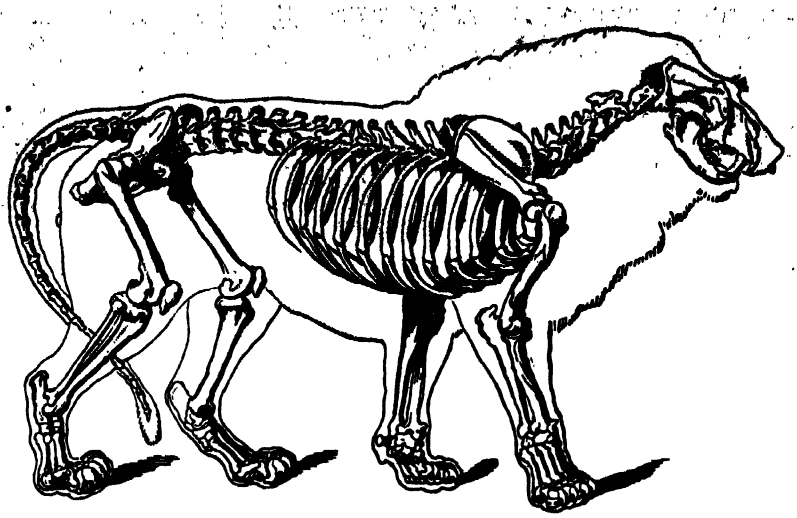


Fig. 1.

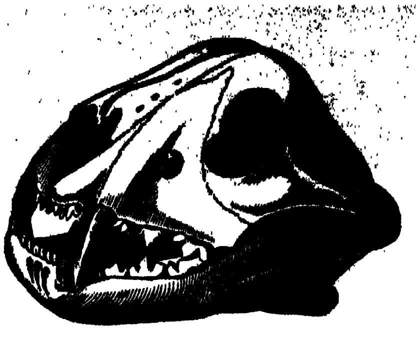


Fig. 3.

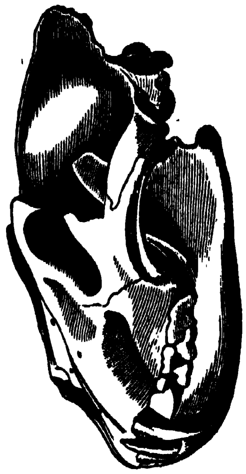


Fig. 4.

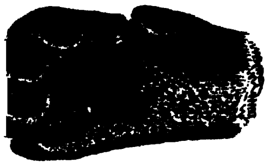


Fig. 5

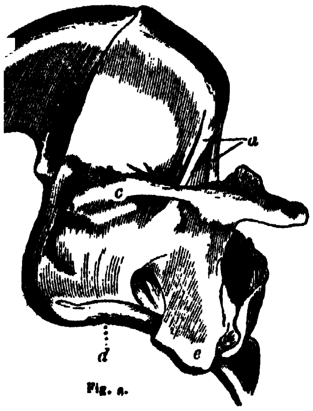
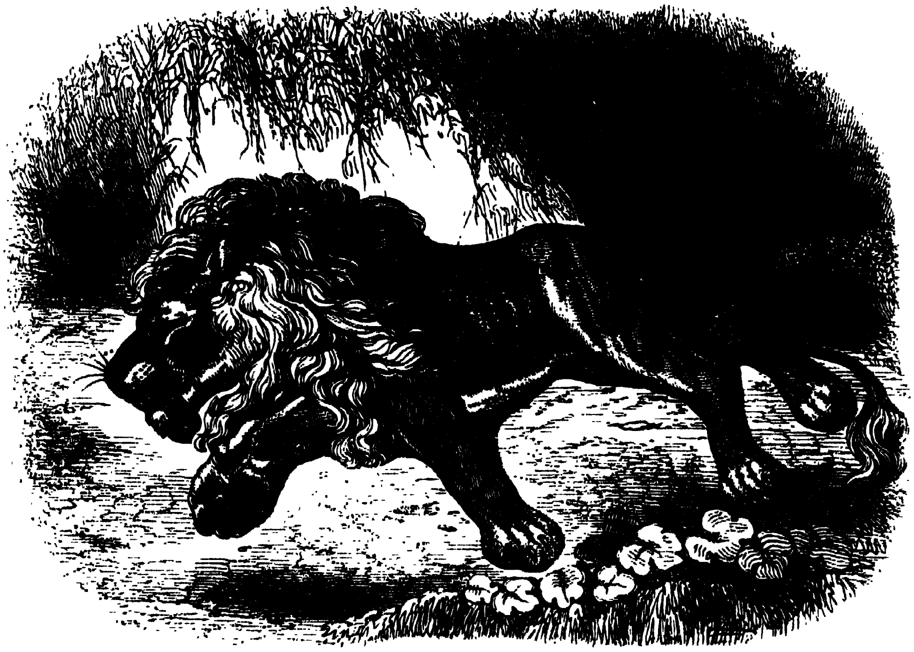


Fig. 6.


16.—Lion expiring.

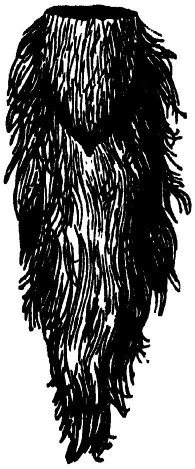


Fig. 13

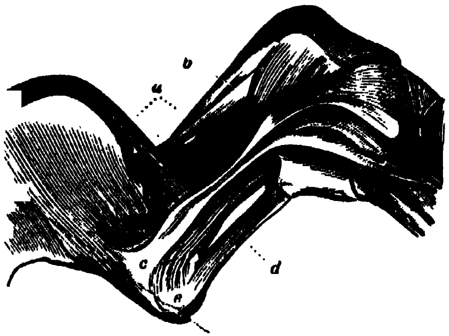


Fig 7

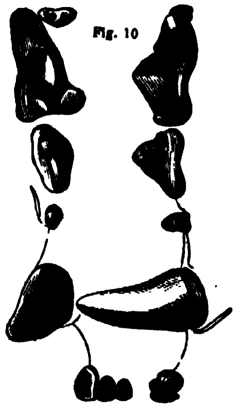


Fig. 10

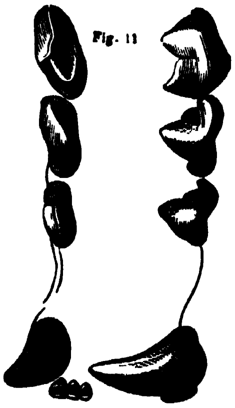


Fig. 11

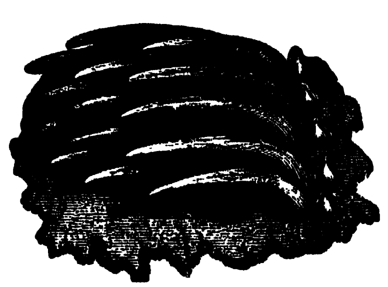


Fig. 14.

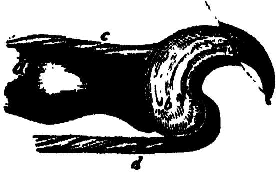


Fig. 8

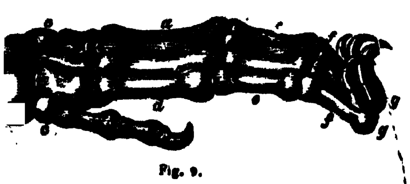


Fig. 9.

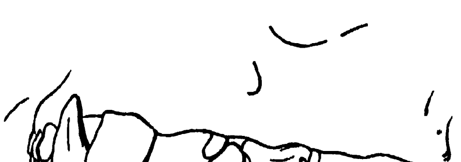


Fig. 12

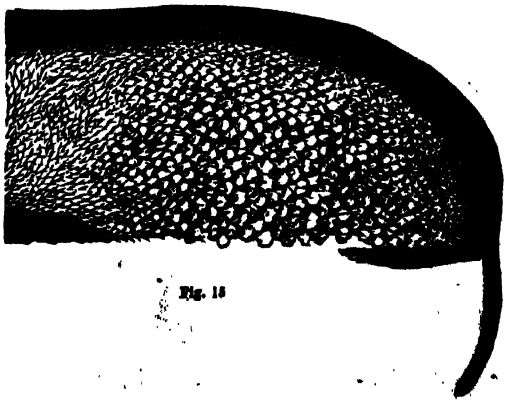


Fig. 15

18.—Lion, with Lioness, from Eastern Asia.

19.—Persian Lion.

17.—African Lion. (Barbary.)

25—27 —Lion-Tiger Cubs.

23 —Lioness and Whelps.

24.—Lion Licking a Man's hand

22.—Cape Lions.

20.—Maneless Lion of Guzerat.

elephants, which often lose all obedience to control at such a moment, together with the rapidity of the attack, render this a critical juncture, and fatal accidents have often embittered the conclusion of the contest. Instances are on record in which men have been carried off by tigers while travelling in company with others. The fate of Sir Hector Monro's son, who was carried off out of the midst of a party refreshing themselves on the edge of a jungle, December, 1792, in Sawgar Island, is known to all. Similar instances are related.

Tigers are destroyed by various devices—pitfalls, traps, the spear, and gun. The plan of the box-trap and looking-glass for taking tigers, leopards, &c., a device to be found in ancient sculpture, according to Montfaucon, is said to be practised by the Chinese at the present day. Fig. 32 refers to this kind of trap.

Those who have represented the tiger as untameable have no ground for the assertion. It is as capable of being tamed, and of attachment to its keeper, as any other animal of its kind. Yet with the tiger, the lion, and others of the race, caution should be used. Their natural disposition is ever ready to break out, and the mildest will, however tame they be, often show 'the wild trick of their ancestors.'

Neither the tiger nor the lion are capable of climbing trees, as are most of the lighter of the feline race: their prey is therefore exclusively confined to antelopes, deer, oxen, horses, and the like; while monkeys, and even birds, are among the prey of the leopard, the panther, and the smaller Felidæ.

29—33. The Leopard, Panther, and Ounce.

The leopard (*Felis Leopardus*), the panther (*Felis Pardus*), and the ounce of Buffon (*Felis Uncia*), have been by many naturalists confounded together, and even with the jaguar of the American continent. With respect to the leopard and panther there are great difficulties in coming to a determination whether they are distinct species or not. In both we observe rosettes, or spots arranged in rose-form, on a fine yellow ground; but in the size and minor arrangement of these rosettes there is the greatest variation. Major H. Smith defines the leopard as differing from the panther in being of a paler yellowish colour, of rather smaller size, and with the dots rose-formed, consisting of several dots partially united into a circular figure in some instances, and into a quadrangular, triangular, or other less determinate form, in others; having also isolated black spots, especially about the outside of the limbs.

In the panther the open spots have the central space darker than the general colour of the sides. The subject is still open for investigation.

Both these beautiful creatures are widely spread in the Old World, being natives of Africa, India, and the Indian Islands, as Ceylon, Sumatra, &c. &c. In Java a black variety (*Felis melas*) is not uncommon, and such are occasionally seen in our menageries: they are deeper than the general tint, and show in certain lights only (fig. 30). A black cub, it is said, occasionally occurs in the same nest with others of the ordinary colours.

Nothing can exceed the grace and activity of these animals: they bound with astonishing ease, climb trees, and swim, and the flexibility of the body enables them to creep along the ground with the cautious silence of a snake on their unsuspecting prey. In India the leopard is called by the natives the Tree Tiger, from its generally taking refuge when pursued in a tree, and also from being often seen among the branches: so quick and active is the animal in this situation, that it is not easy to take a fair aim at him.

Antelopes, deer, small quadrupeds, and monkeys, are its prey. It seldom attacks a man voluntarily, but if provoked becomes a formidable assailant.

The leopard is taken in pitfalls and traps. In some old writers there are accounts of the leopard being taken in a trap by means of a mirror, which, when the animal jumps against it, brings the door down upon him. This story may have received some sanction from the disposition of the domestic cat, when young, to survey her figure in a looking-glass.

The leopard and panther are easily tamed, and become gentle and affectionate, purring when pleased, and rubbing their sides against the bars of their cage, or against their keeper like a cat. When at play they bound around their enclosure with the agility of a squirrel, and so quick that the eye can scarcely follow their movements. From such an exhibition we may easily form some idea of their agile movements in a state of nature.

In Loudon's 'Magazine of Natural History' is an account, by Mrs. Bowdich, of a tame leopard which she had in her possession. She won the affections of the creature by presenting him with lavender-water on a tray-card. The animal revelled in the delicious essence almost to extacy. We know the fondness of the common cat for mint, valerian, and other aromatic herbs, on which they delight to roll. The leopard stands about two feet in height: its figure is slim and graceful, but vigorous, and its proportions admirable.

The ounce (*Once*, Buffon), *Felis Uncia*. Whatever may be the specific distinction between the leopard and panther, no one can hesitate as to the ounce, figured by Buffon, and after him by Bewick ('Quadrupeds').* Till recently, however, it was confounded with one or both of the above animals, but is most decidedly a different species. Our figure (31) is taken from a specimen in the British Museum, which in 1837 Mr. Gray brought before the notice of a scientific meeting of the Zoological Society of London. It formed part of a collection made by the late Colonel Cobb in India. The fur is full and long, indicating most probably a mountain residence rather than the sultry plains. The general colour is grey or whitish-grey, tinged with yellow, lighter on the breast and under parts. The head is marked on the top with black spots, a large one being behind the ears. The body and sides of the limbs are variegated with irregular wavy marks, forming rounded or rather oval figures, but not definitely nor so orderly arranged as in the leopard. The tail, which is very long, is almost bushy, especially at its termination, the hair being very full. An individual of this species was seen by Colonel H. Smith in the Tower, before the menagerie contained within its precincts was dispersed. It was said to have been brought from the Gulf of Persia.

34.—The Rimau-Dahan

(*Felis macrorelis*, Temm.). This beautiful species is a native of Sumatra, where it was discovered by the late Sir Stamford Raffles, who brought a young specimen alive to England, where it died soon after its arrival. A larger and older individual was lost in the Fame. Respecting these individuals, Sir S. Raffles remarks that they were, while in confinement, remarkable for good-temper and playfulness; no domestic kitten could be more so: they courted the notice of persons, throwing themselves on their backs, and delighting to be fondled.

With a small dog that was on board, the rimau-dahan used to play and gambol, at the same time acting with great gentleness. He never seemed to look on men or children as prey, but as companions, and the natives assert that when wild they live principally on poultry, birds, and the smaller kinds of deer. They are not found in numbers, and may be considered as rather rare even in Sumatra: they are found in the interior of Bencoolen, on the banks of the Bencoolen river, and frequent the vicinity of villages, not being dreaded, except for their propensity to destroy poultry. The natives assert that they sleep and often lie in wait for their prey in trees, and from this circumstance they derive the name of dahan, which signifies the fork formed by the branch of a tree, across which they are said to rest and occasionally stretch themselves. The rimau-dahan is, when adult, larger than the leopard, and is remarkable for the thickness and strength of its limbs and paws, but the contour of its body is very graceful. The head is small, and the physiognomy less expressive of ferocity than that of the tiger or leopard. The tail is extremely long and thickly covered with fine full fur, as indeed is the body also. The general ground-colour is brownish-grey, on which are dispersed streaks and marbled markings of black of an irregular form, and more or less angular. Two longitudinal bands pass along the spine; a band stretches from each ear down the side of the neck, and two obliquely traverse each side of the face. The large marbled markings have an abrupt edge behind, and the black has the appearance of velvet.

An allied but much smaller species from the Indian Islands will be found described in the 'Proceedings of the Zoological Society of London' for 1836, p. 107, under the title of Felis Marmorata.

35.—The Nepaul Tiger-Cat.

(*Felis Nepalensis*). This is a slender species, measuring about one foot ten inches in the length of the head and body, that of the tail being ten and a half inches. Its distinguishing characters are its lengthened contour and the slenderness and proportional length of the tail. The ground is tawny-grey, passing into white on the throat and under parts; longitudinal marks of a deep black run down the back, and broad irregular dashes of the same colour ornament the sides, flanks, and outer surface of the limbs; the under parts are marked with oval spots, the thighs externally with rounded spots; the tail above, excepting at the extremity, spotted; the cheeks streaked with two black lines, and a transverse lunar mark passes round the angle of the mouth, while a narrow band is continued across the throat. An individual of this species was formerly living in the gardens of the Zoological Society, London. It was extremely savage and wild: it generally sat up like a domestic cat, and never paced its den as do most of the feline animals. It is stated to have come originally from Nepaul, whence it was sent to Calcutta, and thence brought to England.

36.—The Serval

(*Felis Serval*). The serval is a native of Southern Africa, and is not uncommon in menageries; specimens are living in the gardens of the Zoological Society of London. It is frequently very tame and playful, gambolling like a kitten, and enduring captivity without sullenness or a display of ferocity. The disposition of the feline race greatly depends on the treatment they experience, so that, while some are savage and distrustful, others of the same species are familiar. Some species, however, are more easily reclaimed than others, and of these we may count the serval.

The serval stands about eighteen inches in height at the shoulders: the length of the head and body is thirty-four inches, that of the tail ten inches.

The upper parts are of a clear yellowish white with black spots: the lower parts are white, spotted more distantly with black. Symmetrical lines adorn the head and neck directed towards the shoulders. The back of the ears is black at the base, then barred transversely with white, and tipped with yellow: on the inside of the forelimbs are two black bars. Tail ringed with black.

The general form is slender, and the limbs are thin; the head is long, compressed, and viverrine in its character; the ears are large and broad, and their bases nearly meet each other on the top of the head, giving a singular expression to the physiognomy. In some specimens the markings are more decided than in others. Our measurements are taken from one of five specimens in the Museum at Paris.

37, 38.—The Cheetah

(*Felis jubata*). This elegant animal, the cheetah, or hunting leopard, is spread extensively throughout Africa and India. Mr. Bennett observes that "Chardin, Bernier, Tavernier, and others of the older travellers, had related that in several parts of Asia it was customary to make use of a large spotted cat in the pursuit of game, and that this animal was called youze in Persia, and cheetah in India; but the statements of these writers were so imperfect, and the descriptions given by them so incomplete, that it was next to impossible to recognise the particular species intended. We now, however, know with certainty that the animal thus employed is the *Felis jubata* of naturalists, which inhabits the greater part both of Asia and Africa. It is common in India and Sumatra, as well as in Persia, and is well known both in Senegal and at the Cape of Good Hope; but the ingenuity of the savage natives of the latter countries has not, so far as we know, been exerted in rendering its services available in the chase in the manner so successfully practised by the more refined and civilised inhabitants of Persia and Hindostan."

The cheetah differs in one or two points from the more typical of its race. The Felidæ in general possess a broad rounded paw, armed with sharp-hooked and completely retractile claws, which are protruded at pleasure; but in the cheetah the foot is long and narrow, and more like that of a dog, while the claws, from the laxity of the spring-ligaments, are very partially retracted, and are consequently worn and blunted at the points. As large in the body as the leopard, the cheetah is superior to that animal in height, and differs from it also in general figure. In the first place, the limbs, unadapted for climbing, are long, slender, and tapering; and the body, which is deficient in breadth, reminds one in some degree of that of the greyhound. In consequence of these differences, Wagler separated it into a distinct genus, under the title of Cynailurus, in allusion to its intermediate station between the canine and feline races. The African cheetah has been by some regarded as a distinct species from that of India, under the supposition that the thin mane which covers the back of the neck was characteristic only of the African animal. Under this impression, the term jubata (maned) was restricted to the African, and the term venatica (hunting) given to the Indian, cheetah. This is, however, altogether erroneous. In India the wild animal has a rough coat in which the mane is marked; but domesticated animals from the same part of the country are destitute of a mane, and have a smooth coat. The general colour of the cheetah is fawn-yellow, covered with round black spots; a distinct black stripe passes from the inner angle of the eye to the angle of the mouth. The tip of the nose is black. The profile of the forehead and face is convex; the eye is peculiarly large, fine, and expressive; the pupils are circular; the tail is long, and curled up at its extremity, which is white; the fur is not sleek, but rather crisp. The skin of the cheetah is an article of some importance in trade at Senegal, but is neglected at the Cape of Good Hope: this animal called luipard by the Dutch colonists is indeed rare in that district, but the skin is occasionally seen worn by Kaffir chiefs, by way of distinction. In Africa the rude natives never dream of employing the cheetah as a means of procuring food,—they know not its value in the chase. In Persia and India it has, however, been employed from an early period. In the 'Field-Sports of India,' the mode of coursing with the cheetah is thus described. "They (the cheetahs) are led out in chains, with blinds over their eyes, and sometimes carried out in carts, and when antelopes, or deer, are seen on a plain, should any of them be separated from the rest, the cheetah's head is brought to face it, the blinds are removed, and the chain is taken off. He immediately crouches (see figure 38), and creeps along with his belly almost touching the ground, until he gets within a short distance of the deer, who, although seeing him approach, appears so fascinated that he seldom attempts to run away. The cheetah then makes a few surprising springs, and seizes the deer by the neck. If many deer are near each other, they often escape by flight, their number, perhaps, giving them confidence."

---

* The concluding part of Bewick's details refer to the cheetah, which he elsewhere notices, but not by its name.

We may add to this that the cheetah takes advantage of every means of making its attack, and that, when unsuccessful in its effort, it returns sullenly to its keeper, who replaces the hood, and reserves him for another opportunity. When, however, he has grappled with the quarry and fixed himself upon its throat, drinking the life-blood warm, his nature breaks out in all its violence, so that it requires some management to separate him from his victim. Partly awed by the keeper's voice, partly enticed by pieces of meat, and a ladleful of the blood, he is induced to relinquish the prize, and submit to be again hooded. In all this we are reminded of the art of falconry.

In captivity the cheetah is familiar, gentle, and playful; and becomes greatly attached to those who feed or notice it. The general disposition of these beautiful creatures is, indeed, frank and confiding; and consequently there is little trouble in rendering them perfectly domestic. Their voice of pleasure is a *pur*; of uneasiness or hunger, a short reiterated *mew*.

39 & 49.—THE WILD CAT

(*Felis Catus*). This cat is the *Chat Sauvage* of the French, *Gato Montes* of the Spaniards, *Wilde Katze* and *Baumritter* of the Germans, *Vild Kat* of the Danes, *Cathgoed* of the ancient Britons, and *Catus Sylvestris* of Klein. This species, which yet exists in the mountainous and wooded districts of the British islands, is spread through a great part of Europe and Asia. It is common in the forest tracts of Germany, Russia, Hungary, the north of Asia, and Nepaul. It is larger, and has fuller fur, in the colder latitudes.

In Britain it was formerly very abundant, and was one of the beasts of chase, as we learn from king Richard II.'s charter to the abbot of Peterborough, giving him permission to hunt the hare, fox, and wild cat. The fur in those days does not seem to have been of much value, for it is ordained in bishop Corboyl's canons, A.D. 1127, that no abbess or nun should use more costly apparel than such as is made of lamb's or cat's skins. The wild cat is still found in the hilly parts of the north of England, and more plentifully in Scotland and some parts of Ireland.

Its general form is robust; the tail is bushy, and fuller at the termination. The general colour is grey, undulated with transverse blackish stripes; a black streak runs down the back; the tail is annulated; the soles of the feet to the heel are black; two black stripes pass from the eyes over and behind the ears. The fur is deep. Length of head and body one foot ten inches; of the tail eleven inches. Temminck gives the total average length as three feet. Hares, leverets, rabbits, and birds are its prey. It is bold and savage, and defends its young with great obstinacy. Formerly naturalists regarded this cat as the origin of the domestic cat, but of late years this opinion has been questioned. In the first place, a cat in a domestic condition was one of the animals reverenced by the ancient Egyptians, and mummies of it are found in the pits of Thebes. Now this cat was not the common wild cat, but a distinct species. In the second place, the domestic cat is not noticed as being one of the domestic animals of the ancient Britons by any of the Latin writers, nor, indeed, do we hear of it in our island till the tenth century, when we find its value fixed at a high rate, and laws enacted to regulate its preservation. The Welsh statutes of Howel Dha (who died A.D. 948) are, in fact, proofs of its importance; and such laws would hardly have been laid down had not the animal been regarded in the light of a new and important acquisition. If it were indeed the offspring of the wild cat, which then abounded in the forests of our island, the opportunities of procuring young broods would have been so abundant, that all regulations respecting it would have been superfluous; and still less would the then considerable sums of a penny as the price of a kitten before it could see, two-pence until it caught a mouse, and after that four-pence, have been established. There are, besides, other regulations, all tending to prove the high value affixed to the domestic cat at that period. In the third place, the wild cat is much larger than our domesticated cat, and this is contrary to the general rule, domesticated animals being larger than their wild relatives. It may be observed that the tail of the wild cat is rather short, full, and cylindrical; while in the domestic cat it is long and taper. Besides, the wild cat stands higher on the limbs, and is of a more lynx-like figure. Dr. Fleming considers it probable that the domestic kind is originally from Asia, but Rüppel and Temminck consider it as decidedly the descendant of the tame Egyptian cat (Felis maniculata), found now wild in Upper Egypt and Nubia. It is easy to perceive how from Egypt the domestic cat would pass into Greece and Italy, and so into the western provinces of the Roman Empire. It is most probable, then, that Temminck and Rüppel are correct; but still, has not the domestic cat in Europe subsequently intermingled with the wild cat, and produced a mixed, though fertile, breed? We are inclined to think so. Cats of the domestic kind often assume wild habits, and live in warrens, preserves, and woods: we must distinguish between these and the true wild cat.

40.—THE EGYPTIAN CAT

(*Felis Maniculata*). This cat was discovered in Nubia by Rüppel, west of the Nile, near Ambukol, in a rocky district overrun with brushwood. It is of the size of a moderate domestic cat, and is probably of the same stock as that of the domestic cat which the Egyptians honoured. Rüppel considers it a descendant of that breed, but it may be, and probably is, from the wild original race, and is indigenous in Nubia. It agrees exactly with the preserved mummies of cats which the Egyptians embalmed. The following is a detailed description of this species:—

The woolly or ground hair is in general of a dirty ochreous, darker on the back and posterior parts, and becoming gradually lighter on the anterior and lateral parts; longer hair of a swarthy dirty white, so that the appearance of the animal is greyish-yellow. Skin of the edges of the lips and of the nose bare and black. Beard and bristles of the eyebrows shining white, brown at the roots; edges of eyelids black; iris glaring yellow. From the inner corner near the eye there is a dark-brown streak running in the direction of the nose, and there is a white streak as far up as the arch of the eyebrows; between these two streaks is another greyish one extending on the forehead by the side of the ears and under the eyes. Outside of the ears grey, inside white and without tufts of hair. Eight slender black undulating lines arise on the forehead, run along the occiput, and are lost in the upper part of the neck. Cheeks, throat, and anterior part of the neck shining white. Two ochreous-yellow lines spring, the one from the outer corner of the eye, the other from the middle of the cheek, and meet both together under the ear, and two rings of the same colour encircle the white neck; below the rings there are spots of ochreous-yellow. Chest and belly dirty white, with similar spots or semicircular lines. A dark streak along the back becomes lighter as it rises over the shoulders, and darker on the cross. This streak is gradually lost on the upper part of the tail, the lower surface of which is white-yellow. The tail is almost of an equal thickness, rather slender, and with two dark rings at its point. The extremities, which have less hair in proportion on the outer side, are of the general colour, with besides five or six blackish semicircular bands on the fore-legs, and six distinct dark cross streaks on the hind-legs. The inner sides are lighter in colour, with two black spots or streaks on the upper parts of the fore-legs, and the hind extremities show the cross streaks winding around the thighs towards the inside. Foot, soles, hind parts of ankles, and wrists shining black. Length two feet five inches, the tail being about nine; height at the shoulder about nine inches and a half. The description was taken from an aged female.

41.—THE JAGUAR

(*Felis Onça*). The jaguar is the leopard or panther of the American forests, and in power and daring almost approaches to the tiger of the Indian jungles. We have already stated that specimens of this savage beast have been confounded with the leopard (42, 43); but the jaguar, besides differing in other points, always displays a bold streak or two of black, extending across the chest from shoulder to shoulder, which is a distinctive character. The rosettes on the body are very large, open, and somewhat angular, with a central spot or two of black in each; a central chain of black dashes extends along the spine. The jaguar, though varying in size, generally exceeds the leopard; and its form is more robust and less agile and graceful. The limbs are short, but immensely thick and muscular; the head larger, and of a squarer contour, and the tail of less comparative length. Of all the American Felidæ, the jaguar is the most formidable. It prefers the marshy and wooded districts of the warmer latitudes, and haunts the vast forests along the larger rivers. It swims and climbs with equal ease, and preys on the larger domestic quadrupeds, on peccaries, capybaras, and monkeys, as well as on fish and tortoises. Sonnini saw the scratches left by the claws of the jaguar on the smooth bark of a tree some forty feet high, without branches; he traced the marks of several slips made by the climber, but the animal had at last reached the top. Humboldt heard the jaguar's yell from the tops of the trees, followed by the sharp, shrill, long whistle of the terrified monkeys, as they seemed to flee. It takes birds on their nests, and fish in the shallows; and, in some districts, the havoc it makes among horses, cattle, and sheep is terrible. So great are the numbers of these beasts in the Spanish colonies, that, according to Humboldt, four thousand were annually killed, and two thousand skins were exported every year from Buenos Ayres only. The empty shells of turtles were pointed out to Humboldt as having been cleared of their contents by the jaguar, which watches them as they come to the sandy beaches to lay their eggs, pounces upon them, and turns them on their backs: he then insinuates his paw between the shells, and scoops out the contents as clean as with a knife. As he turns many more than he can devour at a meal, the Indians often profit by his dexterous cunning. The eggs of the turtle are often dug up by him out of the sand, and devoured; and young turtles, on their road to the water, or in shallows, are also destroyed.

It is not often that the jaguar voluntarily attacks man. When hard pressed, however, he makes a resolute defence. The Indians often despatch him with their poisoned arrows, and sometimes boldly attack him with lances. On the plains the lasso is used with great effect.

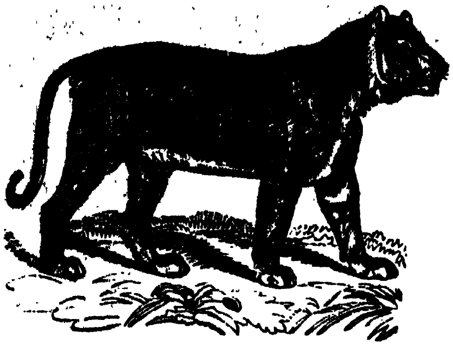
There is a black variety of the jaguar, *le jaguar noir* of the French, and probably the *jaguarete* of Marcgrave. This seems to have been the animal noticed by Lieut. Maw, R.N. ('Journal of a Passage from the Pacific to the Atlantic:' 1829), at Para, as a black onça. It had been procured up the rivers, and was a formidable beast, with limbs as thick as (Lieut. Maw says thicker than) those of a Bengal tiger.

44, 45, 46.—THE PUMA

(*Felis concolor*, Linn.) This large feline animal is often called the American lion, chiefly, as it would appear, from its uniformity of colour, which, combined with its ferocity, led the early travellers to give it that appellation. Thus John de Laet (1633) says that lions are found in Peru, though they be few and not so ferocious as they are in Africa, and that they are called in the native tongue *puma*. In 'The Perfect Description of Virginia,' (a tract, 1649,) "Lyons, beares, leopards, and elkes" are enumerated. Hernandez describes it (1651) as the *puma seu leo Americanus*, and contends, rightly enough, that it is not a true lion. By Piso the animal is noticed as the *cuguacuara*. Marcgrave terms it the *cuguacurana* of the Brazilians; D'Azara, the *gouazouara* of Paraguay. Hence the French name, often used by British writers, *couguar*. Charlevoix describes it under the erroneous names of *carcajou* and *quincajou*. The Anglo-Americans term it "panther," and under this name Lawson, Catesby, and others describe it.

In its general contour, the puma is elegantly formed; but the limbs are very thick, while the head is comparatively small, particularly in the female. The general colour is silvery-fawn above, fading into white beneath and on the inside of the limbs; the ears on the outside, particularly at their base, the sides of the muzzle and the end of the tail, which is destitute of a tuft, black. Length from nose to root of tail, about four feet; of the tail, upwards of two feet. The young are marked with three chains of blackish-brown streaks along the back, and the sides, shoulders, and neck have clouded spots of the same colour. As the animal advances in age, these markings fade, and ultimately disappear.

The puma is extensively spread throughout North and South America; but it is not only more scarce than formerly, but its range is more contracted and, as civilization advances, will be still further reduced. This beautiful animal is savage and ferocious, but easily tamed, and soon becomes very familiar. The late Mr. Edmund Kean had one in his possession, which was perfectly domesticated; and

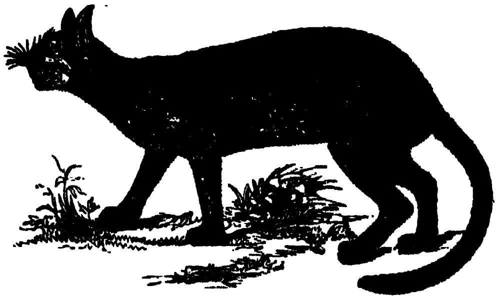


28.—Royal Tiger.

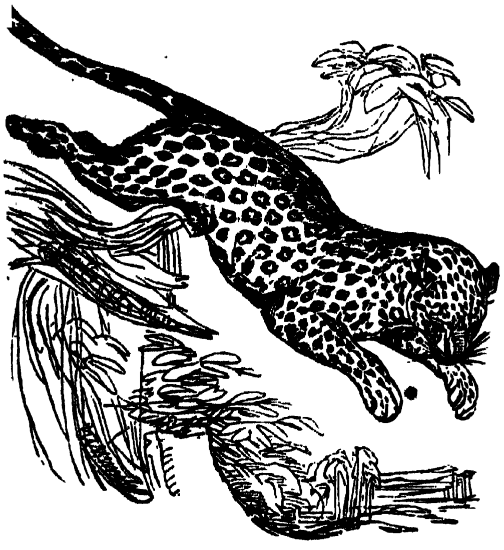
29.—Leopard.

30.—Black Panther.

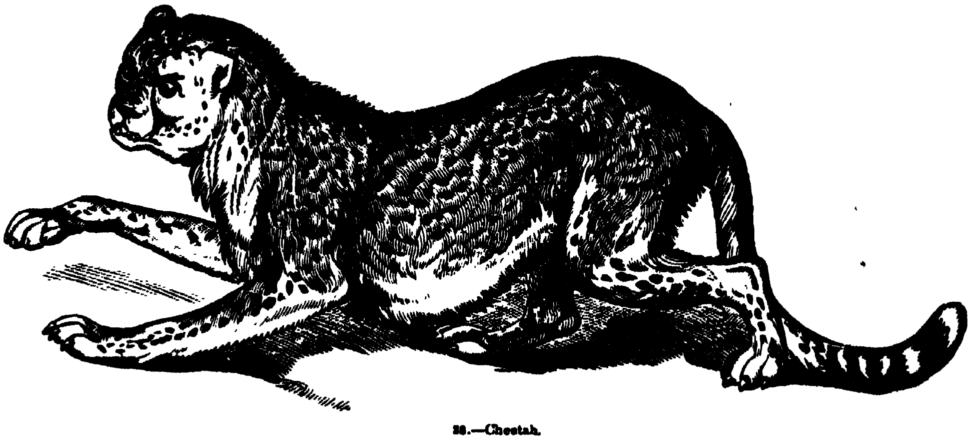
32.—Leopard-catching.



35.—Nepaul Tiger-cat.

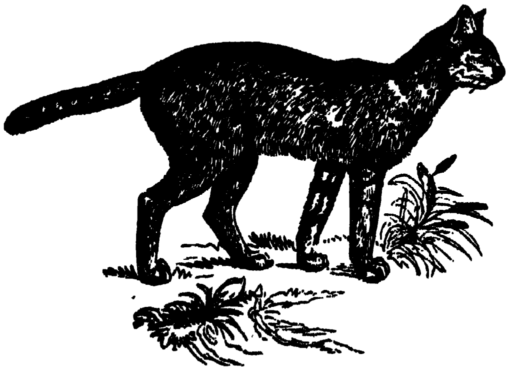


33.—Leopard. (Senegal.)



38.—Cheetah.

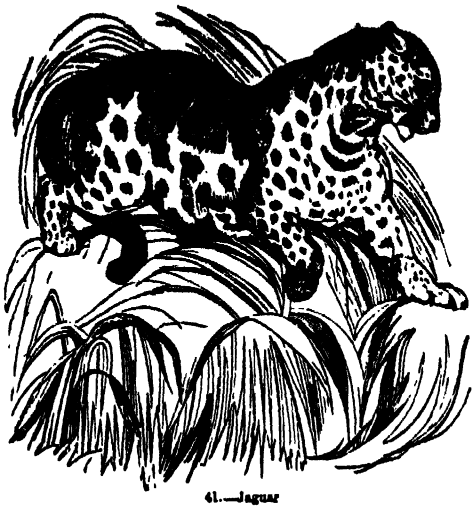
34.—Rimau Dahan.



36.—Serval.

37.—Cheetah.

39.—Wild Cat.



41.—Jaguar

40.—Egyptian Cat.

46.—Puma.

44.—Puma.

42.—Leopard at Bay.

43.—Syrian Leopard.

C

we have seen others very gentle, though playful and animated. Lawson, who, in his 'History of Carolina,' well describes the puma, is therefore in error when he states that "when taken young it is never to be reclaimed from its wild nature." This writer says, "The *panther* (puma) climbs trees with the greatest agility imaginable, is very strong-limbed, catching a piece of meat from any animal he strikes at; his tail is exceeding long; his eyes look very fierce and lively, are large, and of a grayish colour; his prey is swine's-flesh, deer, or anything he can take. He halloos like a man in the woods when killed, which is by making him take to a tree, as the least cur will presently do; then the huntsmen shoot him; if they do not kill him outright he is a dangerous enemy when wounded, especially to the dogs that approach him. This beast is the greatest enemy to the planter of any vermin in Carolina. His flesh looks as well as any shamble's meat whatsoever: a great many people eat him as choice food, but I never tasted of a panther, so cannot commend the meat by my own experience. His skin is a warm covering for the Indians in winter, though not esteemed among the choice furs. This skin dressed makes fine women's shoes or men's gloves."

The puma is indeed a very destructive animal: not only the peccary and the capybara fall a prey to his destructive habits, but sheep, hogs, and cattle are among his victims; of the former he has been known to kill fifty in a single night. It is not often that the puma attacks man, though when wounded he becomes a dangerous foe. Sir F. Head, in his 'Journey across the Pampas,' gives the following interesting narrative, in proof of the fear of man which this animal, in common with others, entertains. The person who related it to Sir Francis was himself the actor in the scene.

"He was trying to shoot some wild ducks, and, in order to approach them unperceived, he put the corner of his poncho (which is a sort of long narrow blanket) over his head, and, crawling along the ground upon his hands and knees, the poncho not only covered his body, but trailed along the ground behind him. As he was thus creeping by a large bush of reeds, he heard a loud sudden noise, between a bark and a roar: he felt something heavy strike his feet, and, instantly jumping up, he saw, to his astonishment, a large lion actually standing on his poncho; and, perhaps, the animal was equally astonished to find himself in the immediate presence of so athletic a man. The man told me he was unwilling to fire, as his gun was loaded with very small shot; and he therefore remained motionless, the lion standing on his poncho for many seconds: at last the creature turned his head, and, walking very slowly away about ten yards, he stopped and turned again: the man still maintained his ground, upon which the lion tacitly acknowledged his supremacy, and walked off." (Fig. 45.)

Audubon in his 'Ornithological Biography,' gives a spirited account of the chase of the puma, or cougar as he terms it, which was hunted by dogs, and men armed with rifles: it was driven by their united exertions from tree to tree, and perished, fighting with the dogs, having received several balls, one of which produced a mortal wound. On the Pampas the puma is hunted with dogs, and, while it is engaged in the conflict surrounded by them, the dexterous Gaucho strikes him senseless with his bolas, or throws his lasso over him, and, galloping off, drags him along the ground till almost lifeless, when the dogs rush upon him and tear him to pieces.

47, 48, 50.—The Ocelot

(*Felis pardalis*). This elegantly-marked species of tiger-cat is a native of Mexico, Paraguay, and probably of Peru. It measures nearly three feet in the length of the head and body, the tail is about a foot long, and the medium height is about eighteen inches. The ground-colour of the fur is grey, slightly tinged with fawn; upon this are disposed longitudinal bands, of which the margins are perfectly black, the central parts being of a deeper fawn than the general ground. These ribands of black, enclosing a deep fawn, become deep black lines and spots on the neck and head and on the outer aspect of the limbs. From the top of the head towards the shoulders there pass several diverging black bands, and on the top of the back the line is quite continuous. The tail is spotted upon a ground like that of the body. The term ocelot is a corruption of the Mexican names Tlacoozelotl, or Tlalocelotl, as given by Hernandez, who terms it *Catus pardus Mexicanus*.

The ocelot is often exhibited in menageries, and is generally good-tempered and playful; we have seen several which might be said to be perfectly domesticated. Bewick states that "nothing can soften the natural ferocity of its disposition, nor calm the restlessness of its motions. One of these animals, shown at Newcastle in 1788, although extremely old, exhibited great marks of ferocity. It was kept closely confined, and would not admit of being caressed by its keeper." Harsh usage and close confinement have often spoiled the temper of animals, and the fault is always laid to their disposition, and not to mismanagement. Mr. Bennett informs us that a specimen which was kept in the Tower menagerie was extremely familiar, and had much of the character and manners of the common cat. Its food consisted principally of rabbits and birds; the latter it plucked with great dexterity, and always commenced its meal with the head, of which it seemed particularly fond; but it did not eat with the ravenous avidity which characterizes nearly all the animals of this tribe.

Of the manners of the ocelot in a state of nature little is known. It inhabits the deep forests and preys upon small quadrupeds and birds; climbing the trees in quest of the latter, and lying in wait for them concealed among the foliage. It is said to take monkeys by a very subtle mode of proceeding. When it perceives a troop of these active creatures, it immediately stretches itself out, as if dead, on the limb of some tree; urged by curiosity they hasten to examine the supposed "mortal remains" of their enemy,—the foremost pays dearly for his curiosity.

51.—The Chati

(*Felis mitis*). The chati is regarded by Desmarest as the chibi-guazu of Azara. It is a native of Paraguay and other parts of South America, and is much smaller than the ocelot. Azara describes it as averaging three feet six inches in total length. The following is Fred. Cuvier's description of a female living in the menagerie of Paris:—"About a third larger than the domestic cat: length, exclusive of tail, rather more than two feet; tail, eleven inches; height to middle of back, about one foot two inches. Ground-colour of fur on the upper parts, pale yellowish; on the lower pure white; at the roots, dull grey, and very thick and close. Body covered with irregular dark patches: those upon the back entirely black and disposed longitudinally in four rows; those upon the sides surrounded with black, with the centres of a clear fawn, arranged in nearly five rows. Spots upon the lower part of the body, where the ground-colour of the fur is white, full, and arranged in two lines composed of six or seven patches on each side. Limbs covered with nearly round spots of smaller dimensions: on the fore-legs, near the body, two transverse bands. On the throat a sort of half collar, and on the under-jaw two crescent-shaped spots. Behind each eye two bands about two inches long, terminating opposite the ear. Forehead bordered by two lines, between which are numerous spots, and, at their origin, a blackish mark from which the whiskers spring. Outside of the ear, black, with a white spot upon the small lobe. Base of the tail spotted with small blotches, which towards the end run into half-rings, which are broadest on the upper surface. Pupil round." (F. Cuv.)

This animal was extremely gentle and familiar, so much so indeed that, if persons to whom it was attached passed its cage or did not approach it, it would express its discontent or solicit their attention by a short cry; and when caressed it manifested great delight.

According to Azara, the chibi-guazu is so common, that his friend Noseda captured eighteen individuals in two years within two leagues of his *pueblo*. Yet it would appear that few are acquainted with the animal, neither the huntsman nor his dogs being able to penetrate its haunts. By day it remains concealed in the most impenetrable and secluded places, only coming abroad after dark, especially when the night is stormy. The chibi-guazu then daringly enters courtyards and destroys the poultry or carries them away. When the night is moonlit they do not venture near inhabited spots, and are besides so wary, that it is hopeless to lie in wait for them with a gun. Men and dogs are most cautiously avoided. Each pair is supposed to have their own exclusive range of territory, for a male and female, and no more, are always caught in the same place. Those which Noseda caught soon became reconciled to captivity, and had much of the habits of a cat: nearly the whole of the day they passed in sleep rolled up in ball-like form; twilight and night were passed in pacing to and fro close to the sides of their den. They never quarrelled unless they were much irritated, and then they struck at each other with their fore-paws; when they crossed or interrupted each other's movements in traversing the den, they spit and gesticulated like a common cat. They were fed upon various kinds of flesh, rats, fowls, ducks, young dogs, &c. Cats' flesh gave them the mange, under which they soon sank: snakes, vipers, and toads, occasioned violent and continued vomiting, under which they wasted away and died. Dogs equalling themselves in size they would not attack: fowls were their favourite food; these they caught by the head and neck and instantly killed, stripping their feathers before beginning to eat them. In the night their eyes shone like those of a domestic cat, which in their manners, in their mode of licking the fur and cleaning themselves, they entirely resembled. Azara concludes by stating that a young one which Noseda caught became so thoroughly domesticated, that it slept on the skirts of his clerical gown and went about loose. No animal could be more tractable; but the neighbours, among whose poultry it made havoc, killed it.

52.—The Pampas Cat

(*Felis Pajeros*). This species is also called Jungle-cat, and by the Spanish colonists *Gato Pajero*.

The fur of this animal is very long, some of the hairs of the back being upwards of three inches, and those of the hinder part of the back four and a half or nearly five inches long. General colour pale yellow-grey. Numerous irregular yellow or sometimes brown stripes run obliquely from the back along the sides of the body. On each side of the face two stripes of a yellowish or cinnamon colour commence near the eye and extend backwards and downwards over the cheeks, on the hinder part of which they join and form a single line, which encircles the lower part of the throat. Tip of the muzzle and chin white; a spot in front of the eye, and a line beneath the eye, of the same colour; belly, inner side and hinder part of fore-legs, white also. An irregular black line running across the lower part of the chest, and extending over the base of the fore-legs externally: above this line two other transverse dark markings more or less defined on the chest. On the fore-legs three broad black bands, two of which encircle the leg: on the posterior legs about five black bands externally, and some irregular dark spots internally. Feet yellowish, and under side of tarsus of a slightly deeper hue. On the belly numerous large irregular black spots. Ears moderate, with long white hairs internally; externally of the same colour as the head, except at the apex, where the hairs are black, and form a slight tuft. Tail short, somewhat bushy, and devoid of dark rings or spots; the hairs are in fact coloured as those on the back. On the upper part of the body each hair is brown at the base, then yellow, and at the apex black. On the hinder part of the back the hairs are almost black at the base, and on the sides of the body each hair is grey at the base; there is then a considerable space of yellowish-white colour: towards the apex they are white, and at the apex black. The greater number of the hairs of the moustaches white. Length, from nose to root of tail, twenty-six inches; of tail, fur included, eleven inches. Height of body at shoulders, thirteen inches. Size about equal to that of the common wild-cat of Europe; but the Pampas cat is stouter, its head smaller, and its tail shorter. (Waterhouse.)

This cat was known to Azara, but till recently European naturalists were but little acquainted with it. Fischer, in his 'Synopsis Mammalium, put it among those species that are not well determined. Azara says that the natives call this animal *gato pajero*, because it lives on the plains, concealing itself in jungles without entering the woods or thickets. Whether this species exists in Paraguay, Azara states, was a point he could not determine, but that it might perhaps have been formerly seen there before the country became well peopled. He caught four in the Pampas of Buenos Ayres, between 35° and 36° S. lat., and three others on the Rio Negro. They are found, he adds, on both sides of La Plata. Its food consists principally of apereas, or wild guinea-pigs.

According to Mr. Darwin (*Zoology of the Beagle*), this cat inhabits Santa Cruz, Patagonia, and Bahia Blanca.

"This animal," observes Mr. Darwin, "takes its name from *paja*, the Spanish word for 'straw,' from its habits of frequenting reeds. It is common over the whole of the great plains which compose the eastern side of the southern part of America. From the accounts I received I have reason to believe that it is found near the strait of Magellan, which would give it a range of nearly 1400 miles in a north and south line," for Azara states that it is to be found as high north as 30° S. lat. One of Mr. Darwin's specimens was obtained at 50° S. at Santa Cruz: it was met with in a valley where a few thickets were growing. When disturbed it did not run away, but drew itself up and hissed. The other specimen which Mr. Darwin brought to England was killed at Bahia Blanca.

LYNXES.

The name of lynxes is applied by zoologists to a subdivision of the Felidæ, well marked externally and regarded by some as entitled to a distinct generic rank. About eight species are described, but there is still considerable confusion among those which are natives of America. The available characters which the lynxes present consist in the pencils which tuft the ears, in the shortness of the tail, and the proportionate elevation of the body at the haunches.

The lynx is one of those animals respecting which many absurd fables have been popularly current, but which are now in no danger of being revived. Pliny (lib. vii., 25) classes the lynx among the monstrous productions of Æthiopia, in the existence of which he seems to have implicitly believed. The lynx is often alluded to by the ancient poets, but from many expressions we easily perceive that they had no very precise ideas about the animal; the lynx of poetry was sometimes a leopard or panther. Virgil calls the lynxes of Bacchus *variæ*, and in another place alludes to the skin of the spotted lynx (*maculosæ lyncis*).

The representations of lynxes on antique gems and sculptures are as unsatisfactory and vague as the allusions in classic poetry. Still however the lynx described by Aristotle, Ælian, and Oppian was, it must be confessed, not one of these doubtful creatures, but a definite species, and, as we think, the caracal.

53, 58, 59.—THE CARACAL

(*Felis Caracal*). This animal derives its modern name from the Turkish, *cara*, black, and *kulash*, ear. Its Persian name has the same meaning, *sujah-gush* or *sia-gusch* (*sia*, black, *gusch*, ear). It is widely distributed, being found in Persia, India, Barbary, Nubia, Egypt, and the whole of Africa to Caffraria, Turkey, and Arabia. The general colour of the body is of a pale reddish-brown, with a vinous tinge; the lower parts are paler. Two spots of pure white are near each eye, one on the inner side of and above the eye, the other beneath its outer angle. The edges of the upper lip, the chin, and lower lip are white, as are the insides of the limbs. The whiskers rise from a series of black lines. The ears are long and tapering, and are surmounted by a pencil of long black hairs; their colour externally is black. The tail reaches only to the heel or hock-joint. Temminck gives the measurements as follows:—length two feet ten inches, of which the tail measures ten. Average height about fourteen inches. We have ourselves seen much larger individuals. The eyes of the caracal have a marked nocturnal character, and are large, bright, and scowling in their expression. The limbs are extremely muscular, and its whole contour denotes great activity. The caracal feeds on small quadrupeds and birds, the latter of which it pursues even to the tops of the trees. It is said to follow the lion and other large beasts of prey for the purpose of feeding on what they leave. The caracal leaps upon its victim and holds it with remarkable tenacity, as was noticed by Ælian. Oppian also alludes to its mode of springing upon hares, deer, &c. According to Temminck, these animals are in the habit of hunting in packs, like wild dogs, and of running down their prey; most probably they creep towards it like the cheetah, and spring suddenly upon it. Pennant, quoting Thévenot, states that they are often brought up tame, and used in the chase of lesser quadrupeds and the larger sort of birds, as cranes, pelicans, peacocks, &c., and that when they seize their prey they hold it fast with their mouth and lie motionless on it. He also adds, on the authority of Hyde, that the Arabians, who call it *Anak-el-ard*, affirm that it hunts like the panther, jumps up at cranes as they fly, and covers its steps when hunting.

In captivity the caracal is very irritable, often displaying great ferocity. Of its fierceness and strengh Dr. Charleton gives evidence, for he relates that he saw one fall on a hound, which it killed and tore to pieces in a moment, although the dog defended itself to the utmost. It would appear, from our repeated personal observations, that few animals of the feline race are more impatient of confinement. Excepting in the instance of very young examples, we never knew one that would suffer the approach of strangers without exhibiting tokens of savage anger. Apparently annoyed by the light, they retire to a corner of their den, and there crouch in sullen and suspicious mood, repelling every attempt towards familiarity by a snarl. When thus irritated the ears are drawn down close to the head, the eyes glare with an expression of malignant fury, and the teeth are displayed, while, at the same time, they utter a deep hissing not unlike that of a cat, and very different from the growl of the lion or tiger. In a state of nature they avoid the face of man, and, though of comparatively small size, are dangerous enemies when hard-pressed or wounded.

54.—THE BOOTED LYNX

(*Felis caligata*). This is a small species with the tail much longer in proportion than in the caracal. The total length is about three feet, of which the tail measures thirteen inches. The ears are large, red within, and tipped with a pencil of brown hairs; the sole and posterior part of the foot, or leg as it is usually called, are of a deep black. The upper parts of the body are of a deep bluish grey, in some specimens fulvous, clouded with grey and sprinkled with black hairs; the lower parts, throat, and breast are reddish; the thighs are marked with indistinct bands of rather bright brown, and two bands cross the cheeks. The tail is black at the tip with three or four incomplete rings above it, separated from each other by whitish intervals. The female has generally the tints more yellow; the young have well-defined dark bands on their sides. This species inhabits the south of India, and Africa from Egypt and Barbary to the Cape of Good Hope. Birds and small quadrupeds are its prey. It makes havoc among the flocks of wild guinea-fowls in Africa, nor does it refuse the remains of large quadrupeds on which the lion or panther have feasted. Cuvier applied the term *Lynx des Marais* to this species as well as to the chaus, but at the same time with a remark that some consider the two animals to be distinct.

55.—THE CHAUS

(*Felis Chaus*, Güldenst.). The Chaus, according to Colonel Sykes, is called *mota rahn manjur*, or larger wild cat, by the Marhattas. This species has been cleared up by Rüppell from the confusion in which it had become involved. He describes it as well covered with fur, the under-coat of which is woolly and soft, but the long hairs are not thickly set. The colour of the woolly hair is a dirty palish ochre yellow, darker on the back, lighter beneath; the long hairs are of the same tint at the base, have a dark-brown middle ring, and are tipped with greyish-yellow, whitish, or saffron, so that the appearance produced is a mixed colouring of greyish-yellow and dirty-white. Many of the hairs on the sides are tipped with black, and, where these are numerous, dusky lines or dashes are produced. The saffron-tipped hairs prevail on the back, and form a yellow stripe from the shoulders to the tail; the nose is black; above and below the eye is a large white spot; a black streak runs from the inner corner of the eye to the nose. The edges of the lips are black, and encircled by a white ring. Cheeks and whiskers white, a few black bristles being interspersed among the latter: back of the ears grey-brown, with black pencils. Externally the limbs are barred with four or five transverse black bands. The tail is one-fourth as long as the body, and annulated towards the termination, which is black and abrupt.

The chaus inhabits the north of Africa along the course of the Nile, and perhaps more remote districts. It is found in the morasses and bushy lowlands that border the Caspian Sea, and along the banks of its tributary rivers. It is said to be common in Persia; it is also an inhabitant of the Deccan. Everywhere it appears to give preference to marshes and boggy wastes, where brushwood affords it shelter. It lives upon birds, small quadrupeds, and even fishes: it seldom climbs trees, and is not easily tamed.

56.—THE EUROPEAN LYNX

(*Felis Lynx*, Temminck, not Linn. and Nilsson; *F. virgata*, Nilsson). This is the ordinary lynx of Europe, extending from Scandinavia to Naples and the Pyrenees. Specimens were lately living in the menagerie of the Zoological Society of London from Norway. Güldenstadt states it to exist on the Caucasus, where it is a great pest. Besides this lynx, Europe possesses the following:—

The Arctic Lynx (*Felis borealis*, Temminck, not Thunberg; *F. Lynx*, Linn. and Nilsson). It inhabits the north of Scandinavia, and probably Siberia and the forest of Ural.

The Great Lynx (*Felis cervaria*, Linn.; *F. borealis*, Thunberg, not Temminck; Siberian Lynx of furriers; Kat-lo of Swedes). It inhabits Norway, Asiatic Russia, and also the Caucasus, according to M. Menestries, who says the Persians call it *Vaarchach*. (See Nilsson.)

The Pardine Lynx (*Felis pardina*, Temminck). This is the Portuguese Lynx of furriers. It is a well-marked species, inhabiting the mountain regions of Spain, Portugal, and other southern districts. Fine examples are living in the menagerie of the Zoological Society of London, and specimens are preserved in the Paris Museum which were killed in Portugal, not far from Lisbon, in 1808: it is a beautiful animal. Colonel Sykes obtained skins in Andalusia, where it is called gato clavo. It inhabits the Sierra Morena.

The European or Red Lynx represented in the figure is of a dull reddish-grey, or rufous tint, with dark rusty-brown spots of an oblong form on the sides, and rounder and smaller spots on the limbs; the under parts are whitish mottled with black. In winter the fur is much longer than in summer, and also fuller; and assumes a hoary tinge, the long hairs becoming tipped with greyish-white; the ears are pencilled; the tail is short, and tipped with black. The length of the head and body is nearly three feet; of the tail, six or seven inches. The European lynx feeds upon small quadrupeds and birds, and climbs trees easily. Hares, squirrels, rabbits, and also sheep, fall victims to it. When attacked by a dog it lies down on its back and defends itself with its claws. Those we have seen in captivity were very playful. Its fur is valuable in commerce; the colder the climate and season of the year, the finer and fuller it is.

"The limits of the lynx," observes Cuvier, "in the ancient continent are not perfectly ascertained. We know, indeed, that it is common in the forests of the north of Europe and Asia. MM. Blumenbach, Bechstein, and Tiedemann cite instances of their having been killed even lately in Germany, but they are becoming more and more scarce. M. Schintz says that it is not uncommon in the mountains of Switzerland. M. Delabre cites an instance of one killed in Auvergne in 1788."

57.—THE CANADA LYNX

(*Felis Canadensis*, Geoff.). There is some question about this species, which we believe to be entirely identical with the *F. borealis* of Temminck; and consequently that the title *Canadensis* is a mere synonym. The range of this boreal lynx is not limited, therefore, to the old world only, but is also extended to the northern parts of America. It is found north of the great lakes, and eastward of the Rocky Mountains: it is rare on the sea-coast, does not frequent the barren grounds, but is not uncommon in the wooded districts of the interior. It is found on the Mackenzie River as far north as 66°. Specimens in the museum of the Zoological Society of London were procured by Douglas in California. Dr. Richardson states that the early French writers on Canada, who ascribed to this species the habit of dropping from the trees on the backs of deer and destroying them by tearing their throats and drinking their blood, gave it the name of Loup Cervier The French Canadians now term it indifferently Le Chat or Le Peeshoo. With respect to its attacking deer in the way said, the statement is erroneous; and if really practised by any ferocious animal, is most probably so by the puma. The same habit has been attributed to the wolverene or glutton, from a mistake of Charlevoix in applying to this lynx the name of Carcajou, which is proper to the wolverene only. The following is Dr. Richardson's description:—

"The head is round, the nose obtuse, and the face has much of the form of that of the domestic cat but the facial line is more convex between the eyes. The ears are erect, triangular, and tipped by an upright slender tuft of coarse black hairs: they are placed about their own breadth apart, and on their porterior surface they have a dark mark beneath the tip, which is continued near both margins downwards towards their bases. On the body and extremities the fur is hoary, most of the hairs being tipped with white; on the crown of the head, and for a broad space down the middle of the back, there is a considerable mixture of blackish-brown, and on the sides and legs of pale wood-brown. In some specimens these colours produce an indistinct mottling, but in general there are no defined markings. A rufous tinge is also occasionally present about the nape of the neck, and on the posterior parts of the thigh. The tail is coloured like the back, except the tip, which is black. The fur is close and fine on the back, longer and paler on the belly. When blown aside it shows on the middle of the back a dark liver-brown colour from the roots to near the tip, but on the sides it is for the greatest part of its length of a pale yellowish-brown, being merely a little darker near the roots. The legs are thick, the toes very thick and furry, and are armed with very sharp awl-shaped white claws, shorter than the fur. There are four toes on each foot, those on the hind-foot being rather the largest, but both feet have much spread. Length three feet, one inch," &c.

This Boreal or Canadian lynx is by no means courageous: it never ventures to attack large quadrupeds, but preys chiefly on the American hare, for the capture of which it is well provided. "Its large paws, slender loins, and long but thick hind-legs, with large buttocks scarcely relieved by a short thick tail, give it an awkward, clumsy appearance. It makes a poor fight when it is surprised by a hunter in a tree; for though it spits like a cat, and sets its hair up, it is easily destroyed by a blow on the back with a slender stick; and it never attacks a man. Its gait is by bounds straightforward, with the back a little arched, and lighting on all the feet at once. It swims well, and will cross the arm of a lake two miles wide, but is not swift on land. It breeds once [illegible]ear, and has two young at a time." Its flesh [illegible] eaten by the natives, and is white and tender, but destitute of flavour, and closely resembles that of the American hare. The skin of this species is an important article in commerce. The annual importation by the Hudson's Bay Company is stated to be from seven to nine thousand.

Besides this lynx there are others in America.

we have seen others very gentle, though playful and animated. Lawson, who, in his 'History of Carolina,' well describes the puma, is therefore in error when he states that "when taken young it is never to be reclaimed from its wild nature." This writer says, "The *panther* (puma) climbs trees with the greatest agility imaginable, is very strong-limbed, catching a piece of meat from any animal he strikes at; his tail is exceeding long; his eyes look very fierce and lively, are large, and of a grayish colour; his prey is swine's-flesh, deer, or anything he can take. He halloos like a man in the woods when killed, which is by making him take to a tree, as the least cur will presently do; then the huntsmen shoot him; if they do not kill him outright he is a dangerous enemy when wounded, especially to the dogs that approach him. This beast is the greatest enemy to the planter of any vermin in Carolina. His flesh looks as well as any shamble's meat whatsoever: a great many people eat him as choice food, but I never tasted of a panther, so cannot commend the meat by my own experience. His skin is a warm covering for the Indians in winter, though not esteemed among the choice furs. This skin dressed makes fine women's shoes or men's gloves."

The puma is indeed a very destructive animal: not only the peccary and the capybara fall a prey to his destructive habits, but sheep, hogs, and cattle are among his victims; of the former he has been known to kill fifty in a single night. It is not often that the puma attacks man, though when wounded he becomes a dangerous foe. Sir F. Head, in his 'Journey across the Pampas,' gives the following interesting narrative, in proof of the fear of man which this animal, in common with others, entertains. The person who related it to Sir Francis was himself the actor in the scene.

"He was trying to shoot some wild ducks, and, in order to approach them unperceived, he put the corner of his poncho (which is a sort of long narrow blanket) over his head, and, crawling along the ground upon his hands and knees, the poncho not only covered his body, but trailed along the ground behind him. As he was thus creeping by a large bush of reeds, he heard a loud sudden noise, between a bark and a roar: he felt something heavy strike his feet, and, instantly jumping up, he saw, to his astonishment, a large lion actually standing on his poncho; and, perhaps, the animal was equally astonished to find himself in the immediate presence of so athletic a man. The man told me he was unwilling to fire, as his gun was loaded with very small shot; and he therefore remained motionless, the lion standing on his poncho for many seconds: at last the creature turned his head, and, walking very slowly away about ten yards, he stopped and turned again: the man still maintained his ground, upon which the lion tacitly acknowledged his supremacy, and walked off." (Fig. 45.)

Audubon in his 'Ornithological Biography,' gives a spirited account of the chase of the puma, or cougar as he terms it, which was hunted by dogs, and men armed with rifles: it was driven by their united exertions from tree to tree, and perished, fighting with the dogs, having received several balls, one of which produced a mortal wound. On the Pampas the puma is hunted with dogs, and, while it is engaged in the conflict surrounded by them, the dexterous Gaucho strikes him senseless with his bolas, or throws his lasso over him, and, galloping off, drags him along the ground till almost lifeless, when the dogs rush upon him and tear him to pieces.

47, 48, 50.—The Ocelot

(*Felis pardalis*). This elegantly-marked species of tiger-cat is a native of Mexico, Paraguay, and probably of Peru. It measures nearly three feet in the length of the head and body, the tail is about a foot long, and the medium height is about eighteen inches. The ground-colour of the fur is grey, slightly tinged with fawn; upon this are disposed longitudinal bands, of which the margins are perfectly black, the central parts being of a deeper fawn than the general ground. These ribands of black, enclosing a deep fawn, become deep black lines and spots on the neck and head and on the outer aspect of the limbs. From the top of the head towards the shoulders there pass several diverging black bands, and on the top of the back the line is quite continuous. The tail is spotted upon a ground like that of the body. The term ocelot is a corruption of the Mexican names Tlacoozelotl, or Tlalocelotl, as given by Hernandez, who terms it *Catus pardus Mexicanus*.

The ocelot is often exhibited in menageries, and is generally good-tempered and playful; we have seen several which might be said to be perfectly domesticated. Bewick states that "nothing can soften the natural ferocity of its disposition, nor calm the restlessness of its motions. One of these animals, shown at Newcastle in 1788, although extremely old, exhibited great marks of ferocity. It was kept closely confined, and would not admit of being caressed by its keeper." Harsh usage and close confinement have often spoiled the temper of animals, and the fault is always laid to their disposition, and not to mismanagement. Mr. Bennett informs us that a specimen which was kept in the Tower menagerie was extremely familiar, and had much of the character and manners of the common cat. Its food consisted principally of rabbits and birds; the latter it plucked with great dexterity, and always commenced its meal with the head, of which it seemed particularly fond; but it did not eat with the ravenous avidity which characterizes nearly all the animals of this tribe.

Of the manners of the ocelot in a state of nature little is known. It inhabits the deep forests and preys upon small quadrupeds and birds; climbing the trees in quest of the latter, and lying in wait for them concealed among the foliage. It is said to take monkeys by a very subtle mode of proceeding. When it perceives a troop of these active creatures, it immediately stretches itself out, as if dead, on the limb of some tree; urged by curiosity they hasten to examine the supposed "mortal remains" of their enemy,—the foremost pays dearly for his curiosity.

51.—The Chati

(*Felis mitis*). The chati is regarded by Desmarest as the chibi-guazu of Azara. It is a native of Paraguay and other parts of South America, and is much smaller than the ocelot. Azara describes it as averaging three feet six inches in total length. The following is Fred. Cuvier's description of a female living in the menagerie of Paris:—"About a third larger than the domestic cat: length, exclusive of tail, rather more than two feet; tail, eleven inches; height to middle of back, about one foot two inches. Ground-colour of fur on the upper parts, pale yellowish; on the lower pure white; at the roots, dull grey, and very thick and close. Body covered with irregular dark patches: those upon the back entirely black and disposed longitudinally in four rows; those upon the sides surrounded with black, with the centres of a clear fawn, arranged in nearly five rows. Spots upon the lower part of the body, where the ground-colour of the fur is white, full, and arranged in two lines composed of six or seven patches on each side. Limbs covered with nearly round spots of smaller dimensions: on the fore-legs, near the body, two transverse bands. On the throat a sort of half collar, and on the under-jaw two crescent-shaped spots. Behind each eye two bands about two inches long, terminating opposite the ear. Forehead bordered by two lines, between which are numerous spots, and, at their origin, a blackish mark from which the whiskers spring. Outside of the ear, black, with a white spot upon the small lobe. Base of the tail spotted with small blotches, which towards the end run into half-rings, which are broadest on the upper surface. Pupil round." (F. Cuv.)

This animal was extremely gentle and familiar, so much so indeed that, if persons to whom it was attached passed its cage or did not approach it, it would express its discontent or solicit their attention by a short cry; and when caressed it manifested great delight.

According to Azara, the chibi-guazu is so common, that his friend Noseda captured eighteen individuals in two years within two leagues of his *pueblo*. Yet it would appear that few are acquainted with the animal, neither the huntsman nor his dogs being able to penetrate its haunts. By day it remains concealed in the most impenetrable and secluded places, only coming abroad after dark, especially when the night is stormy. The chibi-guazu then daringly enters courtyards and destroys the poultry or carries them away. When the night is moonlit they do not venture near inhabited spots, and are besides so wary, that it is hopeless to lie in wait for them with a gun. Men and dogs are most cautiously avoided. Each pair is supposed to have their own exclusive range of territory, for a male and female, and no more, are always caught in the same place. Those which Noseda caught soon became reconciled to captivity, and had much of the habits of a cat: nearly the whole of the day they passed in sleep rolled up in ball-like form; twilight and night were passed in pacing to and fro close to the sides of their den. They never quarrelled unless they were much irritated, and then they struck at each other with their fore-paws; when they crossed or interrupted each other's movements in traversing the den, they spit and gesticulated like a common cat. They were fed upon various kinds of flesh, rats, fowls, ducks, young dogs, &c. Cats' flesh gave them the mange, under which they soon sank: snakes, vipers, and toads, occasioned violent and continued vomiting, under which they wasted away and died. Dogs equalling themselves in size they would not attack: fowls were their favourite food; these they caught by the head and neck and instantly killed, stripping their feathers before beginning to eat them. In the night their eyes shone like those of a domestic cat, which in their manners, in their mode of licking the fur and cleaning themselves, they entirely resembled. Azara concludes by stating that a young one which Noseda caught became so thoroughly domesticated, that it slept on the skirts of his clerical gown and went about loose. No animal could be more tractable; but the neighbours, among whose poultry it made havoc, killed it.

52.—The Pampas Cat

(*Felis Pajeros*). This species is also called Jungle-cat, and by the Spanish colonists *Gato Pajero*.

The fur of this animal is very long, some of the hairs of the back being upwards of three inches, and those of the hinder part of the back four and a half or nearly five inches long. General colour pale yellow-grey. Numerous irregular yellow or sometimes brown stripes run obliquely from the back along the sides of the body. On each side of the face two stripes of a yellowish or cinnamon colour commence near the eye and extend backwards and downwards over the cheeks, on the hinder part of which they join and form a single line, which encircles the lower part of the throat. Tip of the muzzle and chin white; a spot in front of the eye, and a line beneath the eye, of the same colour; belly, inner side and hinder part of fore-legs, white also. An irregular black line running across the lower part of the chest, and extending over the base of the fore-legs externally: above this line two other transverse dark markings more or less defined on the chest. On the fore-legs three broad black bands, two of which encircle the leg: on the posterior legs about five black bands externally, and some irregular dark spots internally. Feet yellowish, and under side of tarsus of a slightly deeper hue. On the belly numerous large irregular black spots. Ears moderate, with long white hairs internally; externally of the same colour as the head, except at the apex, where the hairs are black, and form a slight tuft. Tail short, somewhat bushy, and devoid of dark rings or spots; the hairs are in fact coloured as those on the back. On the upper part of the body each hair is brown at the base, then yellow, and at the apex black. On the hinder part of the back the hairs are almost black at the base, and on the sides of the body each hair is grey at the base; there is then a considerable space of yellowish-white colour: towards the apex they are white, and at the apex black. The greater number of the hairs of the moustaches white. Length, from nose to root of tail, twenty-six inches; of tail, fur included, eleven inches. Height of body at shoulders, thirteen inches. Size about equal to that of the common wild-cat of Europe; but the Pampas cat is stouter, its head smaller, and its tail shorter. (Waterhouse.)

This cat was known to Azara, but till recently European naturalists were but little acquainted with it. Fischer, in his 'Synopsis Mammalium, put it among those species that are not well determined. Azara says that the natives call this animal *gato pajero*, because it lives on the plains, concealing itself in jungles without entering the woods or thickets. Whether this species exists in Paraguay, Azara states, was a point he could not determine, but that it might perhaps have been formerly seen there before the country became well peopled. He caught four in the Pampas of Buenos Ayres, between 35° and 36° S. lat., and three others on the Rio Negro. They are found, he adds, on both sides of La Plata. Its food consists principally of apereas, or wild guinea-pigs.

According to Mr. Darwin (*Zoology of the Beagle*), this cat inhabits Santa Cruz, Patagonia, and Bahia Blanca.

"This animal," observes Mr. Darwin, "takes its name from *paja*, the Spanish word for 'straw,' from its habits of frequenting reeds. It is common over the whole of the great plains which compose the eastern side of the southern part of America. From the accounts I received I have reason to believe that it is found near the strait of Magellan, which would give it a range of nearly 1400 miles in a north and south line," for Azara states that it is to be found as high north as 30° S. lat. One of Mr. Darwin's specimens was obtained at 50° S. at Santa Cruz: it was met with in a valley where a few thickets were growing. When disturbed it did not run away, but drew itself up and hissed. The other specimen which Mr. Darwin brought to England was killed at Bahia Blanca.

LYNXES.

The name of lynxes is applied by zoologists to a subdivision of the Felidæ, well marked externally and regarded by some as entitled to a distinct generic rank. About eight species are described, but there is still considerable confusion among those which are natives of America. The available characters which the lynxes present consist in the pencils which tuft the ears, in the shortness of the tail, and the proportionate elevation of the body at the haunches.

The lynx is one of those animals respecting which many absurd fables have been popularly current, but which are now in no danger of being revived. Pliny (lib. vii., 25) classes the lynx among the monstrous productions of Æthiopia, in the existence of which he seems to have implicitly believed. The lynx is often alluded to by the ancient poets, but from many expressions we easily perceive that they had no very precise ideas about the animal; the lynx of poetry was sometimes a leopard or panther. Virgil calls the lynxes of Bacchus *variæ*, and in another place alludes to the skin of the spotted lynx (*maculosæ lyncis*).

The representations of lynxes on antique gems and sculptures are as unsatisfactory and vague as the allusions in classic poetry. Still however the lynx described by Aristotle, Ælian, and Oppian was, it must be confessed, not one of these doubtful creatures, but a definite species, and, as we think, the caracal.

53, 58, 59.—THE CARACAL

(*Felis Caracal*). This animal derives its modern name from the Turkish, *cara*, black, and *kulash*, ear. Its Persian name has the same meaning, *sujah-gush* or *sia-gusch* (*sia*, black, *gusch*, ear). It is widely distributed, being found in Persia, India, Barbary, Nubia, Egypt, and the whole of Africa to Caffraria, Turkey, and Arabia. The general colour of the body is of a pale reddish-brown, with a vinous tinge; the lower parts are paler. Two spots of pure white are near each eye, one on the inner side of and above the eye, the other beneath its outer angle. The edges of the upper lip, the chin, and lower lip are white, as are the insides of the limbs. The whiskers rise from a series of black lines. The ears are long and tapering, and are surmounted by a pencil of long black hairs; their colour externally is black. The tail reaches only to the heel or hock-joint. Temminck gives the measurements as follows:—length two feet ten inches, of which the tail measures ten. Average height about fourteen inches. We have ourselves seen much larger individuals. The eyes of the caracal have a marked nocturnal character, and are large, bright, and scowling in their expression. The limbs are extremely muscular, and its whole contour denotes great activity. The caracal feeds on small quadrupeds and birds, the latter of which it pursues even to the tops of the trees. It is said to follow the lion and other large beasts of prey for the purpose of feeding on what they leave. The caracal leaps upon its victim and holds it with remarkable tenacity, as was noticed by Ælian. Oppian also alludes to its mode of springing upon hares, deer, &c. According to Temminck, these animals are in the habit of hunting in packs, like wild dogs, and of running down their prey; most probably they creep towards it like the cheetah, and spring suddenly upon it. Pennant, quoting Thévenot, states that they are often brought up tame, and used in the chase of lesser quadrupeds and the larger sort of birds, as cranes, pelicans, peacocks, &c., and that when they seize their prey they hold it fast with their mouth and lie motionless on it. He also adds, on the authority of Hyde, that the Arabians, who call it *Anak-el-ard*, affirm that it hunts like the panther, jumps up at cranes as they fly, and covers its steps when hunting.

In captivity the caracal is very irritable, often displaying great ferocity. Of its fierceness and strengh Dr. Charleton gives evidence, for he relates that he saw one fall on a hound, which it killed and tore to pieces in a moment, although the dog defended itself to the utmost. It would appear, from our repeated personal observations, that few animals of the feline race are more impatient of confinement. Excepting in the instance of very young examples, we never knew one that would suffer the approach of strangers without exhibiting tokens of savage anger. Apparently annoyed by the light, they retire to a corner of their den, and there crouch in sullen and suspicious mood, repelling every attempt towards familiarity by a snarl. When thus irritated the ears are drawn down close to the head, the eyes glare with an expression of malignant fury, and the teeth are displayed, while, at the same time, they utter a deep hissing not unlike that of a cat, and very different from the growl of the lion or tiger. In a state of nature they avoid the face of man, and, though of comparatively small size, are dangerous enemies when hard-pressed or wounded.

54.—THE BOOTED LYNX

(*Felis caligata*). This is a small species with the tail much longer in proportion than in the caracal. The total length is about three feet, of which the tail measures thirteen inches. The ears are large, red within, and tipped with a pencil of brown hairs; the sole and posterior part of the foot, or leg as it is usually called, are of a deep black. The upper parts of the body are of a deep bluish grey, in some specimens fulvous, clouded with grey and sprinkled with black hairs; the lower parts, throat, and breast are reddish; the thighs are marked with indistinct bands of rather bright brown, and two bands cross the cheeks. The tail is black at the tip with three or four incomplete rings above it, separated from each other by whitish intervals. The female has generally the tints more yellow; the young have well-defined dark bands on their sides. This species inhabits the south of India, and Africa from Egypt and Barbary to the Cape of Good Hope. Birds and small quadrupeds are its prey. It makes havoc among the flocks of wild guinea-fowls in Africa, nor does it refuse the remains of large quadrupeds on which the lion or panther have feasted. Cuvier applied the term *Lynx des Marais* to this species as well as to the chaus, but at the same time with a remark that some consider the two animals to be distinct.

55.—THE CHAUS

(*Felis Chaus*, Güldenst.). The Chaus, according to Colonel Sykes, is called *mota rahn manjur*, or larger wild cat, by the Marhattas. This species has been cleared up by Rüppell from the confusion in which it had become involved. He describes it as well covered with fur, the under-coat of which is woolly and soft, but the long hairs are not thickly set. The colour of the woolly hair is a dirty palish ochre yellow, darker on the back, lighter beneath; the long hairs are of the same tint at the base, have a dark-brown middle ring, and are tipped with greyish-yellow, whitish, or saffron, so that the appearance produced is a mixed colouring of greyish-yellow and dirty-white. Many of the hairs on the sides are tipped with black, and, where these are numerous, dusky lines or dashes are produced. The saffron-tipped hairs prevail on the back, and form a yellow stripe from the shoulders to the tail; the nose is black; above and below the eye is a large white spot; a black streak runs from the inner corner of the eye to the nose. The edges of the lips are black, and encircled by a white ring. Cheeks and whiskers white, a few black bristles being interspersed among the latter: back of the ears grey-brown, with black pencils. Externally the limbs are barred with four or five transverse black bands. The tail is one-fourth as long as the body, and annulated towards the termination, which is black and abrupt.

The chaus inhabits the north of Africa along the course of the Nile, and perhaps more remote districts. It is found in the morasses and bushy lowlands that border the Caspian Sea, and along the banks of its tributary rivers. It is said to be common in Persia; it is also an inhabitant of the Deccan. Everywhere it appears to give preference to marshes and boggy wastes, where brushwood affords it shelter. It lives upon birds, small quadrupeds, and even fishes: it seldom climbs trees, and is not easily tamed.

56.—THE EUROPEAN LYNX

(*Felis Lynx*, Temminck, not Linn. and Nilsson; *F. virgata*, Nilsson). This is the ordinary lynx of Europe, extending from Scandinavia to Naples and the Pyrenees. Specimens were lately living in the menagerie of the Zoological Society of London from Norway. Güldenstadt states it to exist on the Caucasus, where it is a great pest. Besides this lynx, Europe possesses the following:—

The Arctic Lynx (*Felis borealis*, Temminck, not Thunberg; *F. Lynx*, Linn. and Nilsson). It inhabits the north of Scandinavia, and probably Siberia and the forest of Ural.

The Great Lynx (*Felis cervaria*, Linn.; *F. borealis*, Thunberg, not Temminck; Siberian Lynx of furriers; Kat-lo of Swedes). It inhabits Norway, Asiatic Russia, and also the Caucasus, according to M. Menestries, who says the Persians call it *Vaarchach*. (See Nilsson.)

The Pardine Lynx (*Felis pardina*, Temminck). This is the Portuguese Lynx of furriers. It is a well-marked species, inhabiting the mountain regions of Spain, Portugal, and other southern districts. Fine examples are living in the menagerie of the Zoological Society of London, and specimens are preserved in the Paris Museum which were killed in Portugal, not far from Lisbon, in 1808: it is a beautiful animal. Colonel Sykes obtained skins in Andalusia, where it is called gato clavo. It inhabits the Sierra Morena.

The European or Red Lynx represented in the figure is of a dull reddish-grey, or rufous tint, with dark rusty-brown spots of an oblong form on the sides, and rounder and smaller spots on the limbs; the under parts are whitish mottled with black. In winter the fur is much longer than in summer, and also fuller; and assumes a hoary tinge, the long hairs becoming tipped with greyish-white; the ears are pencilled; the tail is short, and tipped with black. The length of the head and body is nearly three feet; of the tail, six or seven inches. The European lynx feeds upon small quadrupeds and birds, and climbs trees easily. Hares, squirrels, rabbits, and also sheep, fall victims to it. When attacked by a dog it lies down on its back and defends itself with its claws. Those we have seen in captivity were very playful. Its fur is valuable in commerce; the colder the climate and season of the year, the finer and fuller it is.

"The limits of the lynx," observes Cuvier, "in the ancient continent are not perfectly ascertained. We know, indeed, that it is common in the forests of the north of Europe and Asia. MM. Blumenbach, Bechstein, and Tiedemann cite instances of their having been killed even lately in Germany, but they are becoming more and more scarce. M. Schintz says that it is not uncommon in the mountains of Switzerland. M. Delabre cites an instance of one killed in Auvergne in 1788."

57.—THE CANADA LYNX

(*Felis Canadensis*, Geoff.). There is some question about this species, which we believe to be entirely identical with the *F. borealis* of Temminck; and consequently that the title *Canadensis* is a mere synonym. The range of this boreal lynx is not limited, therefore, to the old world only, but is also extended to the northern parts of America. It is found north of the great lakes, and eastward of the Rocky Mountains: it is rare on the sea-coast, does not frequent the barren grounds, but is not uncommon in the wooded districts of the interior. It is found on the Mackenzie River as far north as 66°. Specimens in the museum of the Zoological Society of London were procured by Douglas in California. Dr. Richardson states that the early French writers on Canada, who ascribed to this species the habit of dropping from the trees on the backs of deer and destroying them by tearing their throats and drinking their blood, gave it the name of Loup Cervier The French Canadians now term it indifferently Le Chat or Le Peeshoo. With respect to its attacking deer in the way said, the statement is erroneous; and if really practised by any ferocious animal, is most probably so by the puma. The same habit has been attributed to the wolverene or glutton, from a mistake of Charlevoix in applying to this lynx the name of Carcajou, which is proper to the wolverene only. The following is Dr. Richardson's description:—

"The head is round, the nose obtuse, and the face has much of the form of that of the domestic cat but the facial line is more convex between the eyes. The ears are erect, triangular, and tipped by an upright slender tuft of coarse black hairs: they are placed about their own breadth apart, and on their porterior surface they have a dark mark beneath the tip, which is continued near both margins downwards towards their bases. On the body and extremities the fur is hoary, most of the hairs being tipped with white; on the crown of the head, and for a broad space down the middle of the back, there is a considerable mixture of blackish-brown, and on the sides and legs of pale wood-brown. In some specimens these colours produce an indistinct mottling, but in general there are no defined markings. A rufous tinge is also occasionally present about the nape of the neck, and on the posterior parts of the thigh. The tail is coloured like the back, except the tip, which is black. The fur is close and fine on the back, longer and paler on the belly. When blown aside it shows on the middle of the back a dark liver-brown colour from the roots to near the tip, but on the sides it is for the greatest part of its length of a pale yellowish-brown, being merely a little darker near the roots. The legs are thick, the toes very thick and furry, and are armed with very sharp awl-shaped white claws, shorter than the fur. There are four toes on each foot, those on the hind-foot being rather the largest, but both feet have much spread. Length three feet, one inch," &c.

This Boreal or Canadian lynx is by no means courageous: it never ventures to attack large quadrupeds, but preys chiefly on the American hare, for the capture of which it is well provided. "Its large paws, slender loins, and long but thick hind-legs, with large buttocks scarcely relieved by a short thick tail, give it an awkward, clumsy appearance. It makes a poor fight when it is surprised by a hunter in a tree; for though it spits like a cat, and sets its hair up, it is easily destroyed by a blow on the back with a slender stick; and it never attacks a man. Its gait is by bounds straightforward, with the back a little arched, and lighting on all the feet at once. It swims well, and will cross the arm of a lake two miles wide, but is not swift on land. It breeds once [illegible]ear, and has two young at a time." Its flesh is eaten by the natives, and is white and tender, but destitute of flavour, and closely resembles that of the American hare. The skin of this species is an important article in commerce. The annual importation by the Hudson's Bay Company is stated to be from seven to nine thousand.

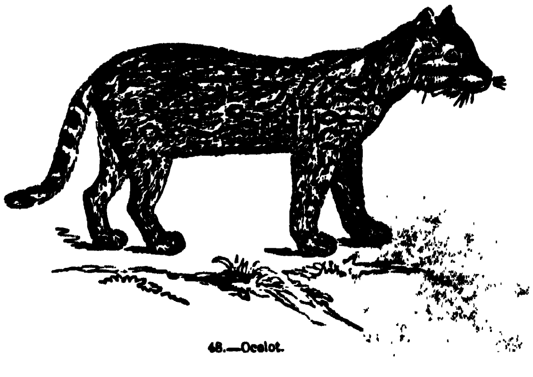
Besides this lynx there are others in America.

47.—Ocelot.

Domestic Cat.

52.—Pampas Cat.

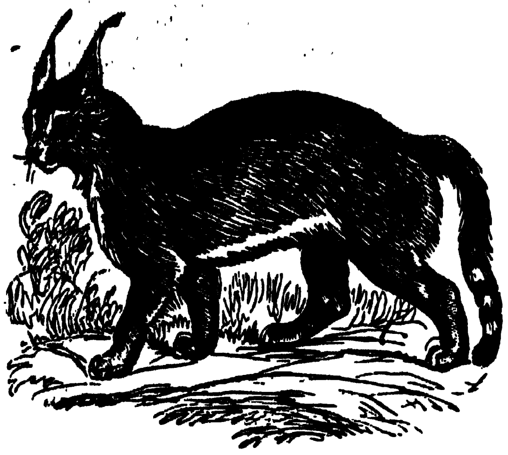
50.—Ocelot.



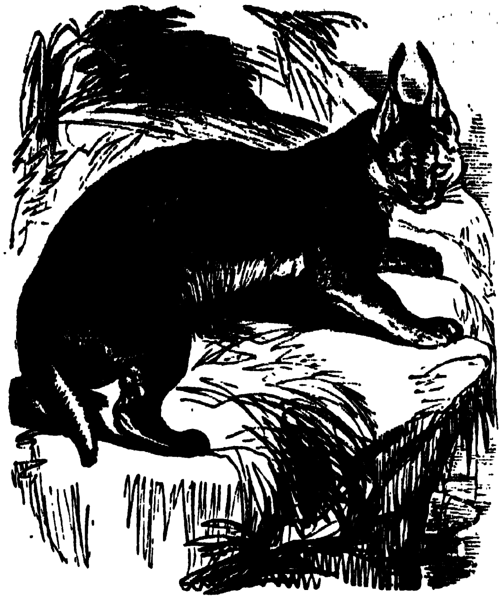
48.—Ocelot.

51.—Chati.

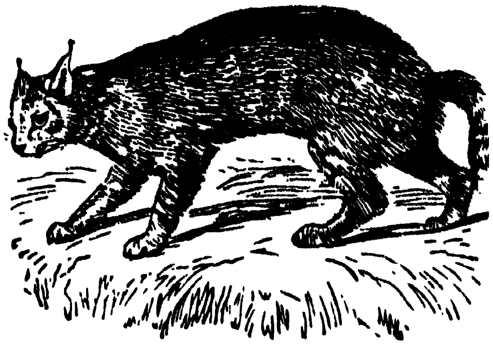
49.—Wild Cat.



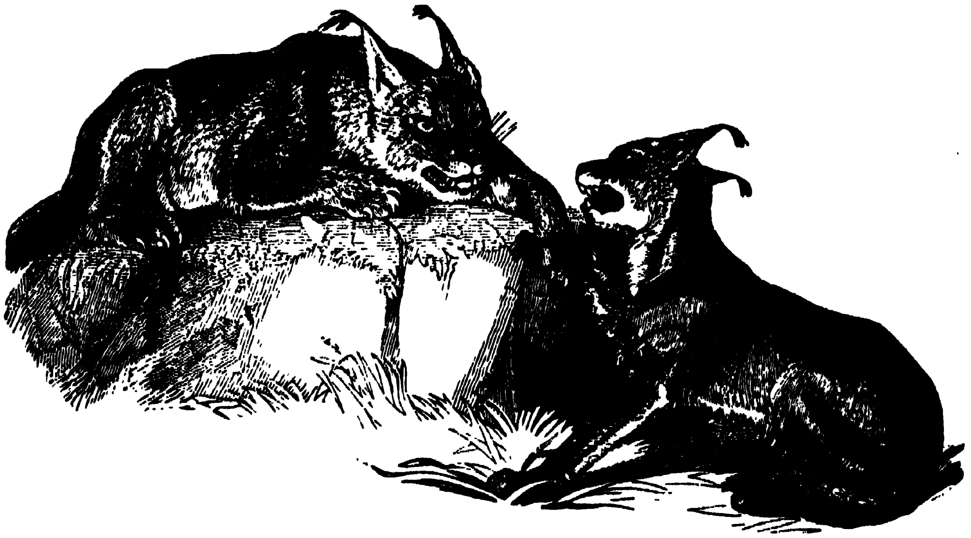
54.—Booted Lynx.



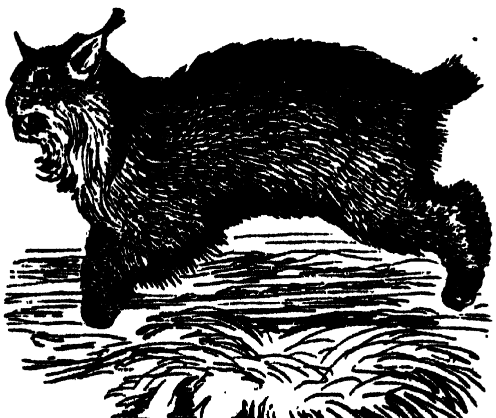
53.—Caracal.



55.—Chaus.

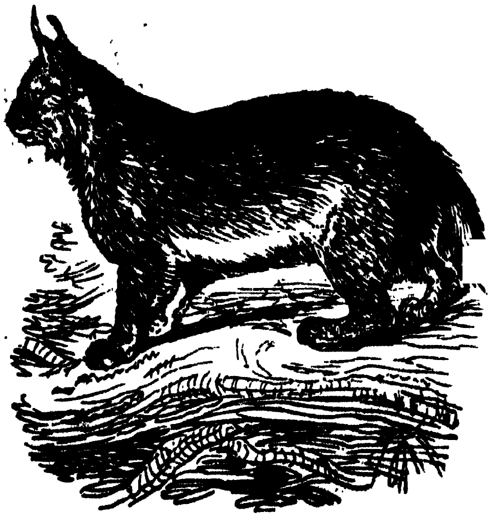


59.—Caracals



57.—Canada Lynx.

58.—Caracal.



56.—European Lynx.

MARSUPIALIA.

Most zoologists of the present day, and among them the first comparative anatomists, concur in regarding the marsupial animals (Marsupialia or Marsupiata[*]) as a distinct group, or sub-class of the Mammalia. They differ essentially from all others in their organization, yet comprehend genera fed by every variety of nutriment. Some are insectivorous or carnivorous, others herbivorous, and others again frugivorous; some are diurnal, others nocturnal in the habits. Accordingly we find a corresponding modification of the teeth and digestive organs, as well as of those of progression and prehension. Hence may we trace in them analogies to the groups of the ordinary mammiferous quadrupeds, viz., to the Carnivora, the Insectivora, the Rodents, and the Edentata, as was well observed by Cuvier, whose opinions have been abundantly confirmed. It is on physiological grounds that the distinctness of the Marsupials rests, that is, on their structure and economy connected with the reproduction of their species, on the abbreviated term of gestation, and on the immature condition of the young at their birth, which are generally received into the marsupium or pouch, in which nidus the undeveloped being attaches itself to the teats, receives nutriment, and grows, till at length it is capable of acting for itself. In some instances the marsupium is nothing more than a fold of skin, and sometimes it is wanting; but two bones, situated on the anterior part of the pelvis, and termed the marsupial bones, are never absent. These grounds of distinction have been extended by the researches of anatomists, and among them in particular Professor Owen, who has pointed out several never-failing accordances in the structure of other organs, as the heart and the brain, and also has cleared up many points respecting which doubts had previously existed. Into the series of facts and deductions so luminously treated by that philosophic investigator of nature the plan of this work forbids us to enter: we refer our readers, however, to the 'Phil. Trans.,' part ii., 1834; the 'Proceed. Zool. Soc. Lond.,' 1831, 1833, 1838, and 1839; 'Phil. Trans.,' part i., 1837; 'Annals of Nat. Hist.,' Nov., 1839; 'Proceed. Geol. Soc. Lond.,' vol. iii., 1838-9, &c.

The Marsupial animals are all restricted to two portions of the globe, namely, America and Australia, including certain islands of the Indian Archipelago. The American species were the first known to European naturalists, and, indeed, the only ones with which Linnæus was acquainted. Captain Cook introduced the kangaroo of Australia to science, and subsequent researches in that region, the newest continent, have made us now familiar with its Fauna and Flora. Upwards of seventy species of Marsupials are known as Australian, besides about eighteen species belonging to other groups of quadrupeds, as the dingo dog, certain seals, a few bats, and Rodents. The marsupial sub-class contains the following families, viz.: 1. Didelphidæ. 2. Dasyuridæ. 3. Myrmecobiidæ. 4. Peramelidæ. 5. Macropidæ. 6. Phalangistidæ. 7. Phascolomyidæ. 8. Monotremata. Of each of these family sections we shall give examples.

OPOSSUMS.

60, 61.—The Virginian Opossum

(*Didelphis Virginiana*). The genus Didelphis, of which the Virginian opossum is an example, is restricted to America. It contains about twenty species, some of which are very small.

The teeth are as follows:—upper incisors ten, of which the two middle are longer than the rest, and somewhat separated from them; lower incisors eight; canines as usual; molars on each side above, seven, the three first false, triangular, compressed; molars below, seven, the three first false; the true molars both above and below crowned with sharp tubercles. Of all terrestria mammalia, the Myrmecobius excepted, the teeth are in these animals the most numerous, amounting to fifty: Incisors $\frac{10}{8}$, canines $\frac{1-1}{1-1}$, molars $\frac{7-7}{7-7} = 50$. (See figure 62.) The limbs are short, the feet plantigrade, the toes five on each foot, armed with sharp strong curved claws, excepting the inner toe or thumb on the hinder feet, which is opposable, and destitute of a nail. The soles are covered with a naked skin endowed with great sensibility. The tail is scaly and naked, except at its base, and constitutes an organ of prehension, not, however, to the same extent in every species. The head is long and pointed, the profile straight. The eyes are small, dark, prominent, and undefended by eyelids, but furnished with a nictitating membrane. The ears are large, thin, naked, and rounded. The tongue is rough with horny papillæ. The snout is long; the muzzle pointed, naked, and moist; the nostrils are lateral; the mouth extremely wide; and the expression of the physiognomy peculiar and unpleasant. In one division of this genus the females have a pouch for their young; in another division the pouch is rudimentary, consisting of a slight fold of skin.

In the figure (63) of the skeleton of the Virginian opossum, the marsupial bones (*a*, are seen.

The Virginian opossum, and its immediate relatives, are slow in their movements, and nocturnal in their habits; they reside habitually on the branches and in the hollows of trees, remaining torpid during the day. At night they prowl about, and feed upon insects, eggs, birds, reptiles, and small mammalia, adding also fruits and roots to their diet. Their sense of smell is in high perfection. Like our pole-cat, as respects voracity, though not activity, they often invade the precincts of the farm-house, destroy poultry and other domestic birds, and retreat on the first appearance of dawn, leaving their slaughtered victims behind. Their odour is disgusting, especially when alarmed or irritated.

The Virginian opossum is common in many parts of North America, from Mexico to the southern provinces of the United States. It is one of the largest and most robust of the genus, and equals a cat in size, being about twenty-two inches in the length of the head and body measured over the curve of the back; the tail is fifteen inches long. The under fur is deep and woolly, traversed by long straight whitish hairs, often tipped with brown. The ears are large and black, margined at the tip with white. The scaled portion of the tail of a whitish tint. The general colour of the fur is dirty-white, with a slight yellow hue; the legs are dusky-brown, a tint of which surrounds the eyes. Hairs of moustaches long and white, with a few of a black colour intermixed.

There is nothing pleasing either in the appearance or habits of the Virginian opossum: in captivity it is slothful in the extreme, and becomes inordinately fat, eating both animal and vegetable diet. Whatever may be its cunning in a state of liberty, it evinces but little intelligence when caged in our climate, but appears to be a compound of indolence and apathy, not unmixed with timidity. In its native woods it suffers from the attacks of birds and beasts of prey, and is also hunted by man for the sake of the flesh and fat. "As soon as the opossum discovers the approach of his enemies, he lies perfectly close to the branch, or places himself snugly in the angle where two limbs separate from each other. The dogs, however, soon announce the fact of his presence by their baying, and the hunter, ascending the tree, shakes the branch upon which the animal is seated with great violence, so as to alarm and cause him to relax his hold." In this way, driven from branch to branch, he is obliged at last to drop to the ground, where, unless the dogs are vigilant, the animal escapes; for, as is asserted, it steals slowly and quietly to a little distance, and gathering up itself into a small compass, assumes the stillness and attitude of death. This artifice, under the obscurity of night, and amidst dense rank herbage, or tangled underwood, often proves successful. In the 'Perfect Description of Virginia,' 1649, it is noticed as a beast "that hath a bagge under her belly, into which she takes her young ones, if at any time affrighted, and carries them away." Lawson states that the '*Possum* is found nowhere but in America. She is the wonder of all the land animals, being the size of a badger, and near that colour. The female doubtless breeds her young at her teats, for I have seen them stick fast thereto, when they have been no bigger than a small raspberry, and seemingly inanimate. She has a paunch or false belly, wherein she carries her young, after they are from those teats, till they can shift for themselves. Their food is roots, poultry, or wild fruits. They have no hair on their tails, but a sort of a scale, or hard crust, as the beavers have. If a cat has nine lives, this creature surely has nineteen; for if you break every bone in their skin, and mash their skull, leaving them for dead, you may come an hour after, and they will be gone quite away, or perhaps you may meet them creeping away. They are a very stupid creature, utterly neglecting their safety. They are most like rats of anything. I have, for necessity in the wilderness, eaten of them. Their flesh is very white, and well tasted; but their ugly tails put me out of conceit with that fare. They climb trees as the racoons do. Their fur is not esteemed nor used, save that the Indians spin it into girdles and garters." The prehensile power of the tail serves the animal in more ways than one, for it is stated that the little ones when advanced in growth leap upon their mother's back if they are frightened, and, twisting their tails round hers, escape, with her assistance, the threatened danger.

This animal climbs with great facility, and will hang suspended from the branches by its tail, and by swinging its body contrive to fling itself to the adjoining boughs. It is often observed hanging motionless for a considerable time with its head downwards.

The opossum produces several young, sometimes as many as sixteen at a birth. She makes a thick nest of dry grass, in some obscure retreat, in which to conceal herself. When first born the young are in a most rudimentary state, minute, blind, naked, and shapeless. Yet even in this state they are always found adhering to the teats of the mother, shrouded in her pouch. There they remain until they have attained the size of a mouse, which is not until the fiftieth day, at which period their eyes are opened, and their bodies are covered with hair. They now venture occasionally from their hiding-place, returning to it on the least appearance of danger; nor is it until they have attained to a considerable size that they finally quit their anxious parent. The period of gestation is said to be twenty-six days.

64.—Merian's Opossum

(*Didelphis dorsigera*). Among the opossums, in which a fold of the skin of the abdomen forms only a rudimentary pouch, must be enumerated Merian's opossum. Though the other opossums with complete marsupial pouches occasionally carry their young on the back, with their tails twined round that of the parent, still it is in these pouchless species that this curious habit most usually prevails; hence the term *dorsigera*, which, though applied to the present animal, might with equal propriety be given to other species, as *Didelphis brachyura*, *cinerea*, *tricolor*, and *murina*.

Merian's opossum is a native of Surinam, and in its habits it agrees with the rest of the genus. The tail is slender, and longer than the head and body taken together; at the base it is clothed with fur resembling that of the body generally; the naked portion is of a pale brown tint. The fur of this animal is short and lies close; on the upper parts of the body it is greyish brown, the roots of the hairs being paler. The under parts of the body are yellowish white; a deep brown spot encircles the eyes; the forehead, top of the head, cheeks, outer side of the limbs and feet, are yellowish white. Length from nose to root of tail about six inches; length of tail seven inches. A beautiful specimen of this active little opossum, with its young clinging to it, is preserved in the British Museum.

65.—The Yapock Opossum

(*Cheironectes palmatus*). This interesting animal, the yapock, is a native of Brazil, tenanting the smaller streams and rivers, and it appears to extend from the confines of that empire to the shores of the Gulf of Honduras. Buffon's specimen was procured in Cayenne. He terms it "*Petite Loutre de la Guyene*." It is also called "Demerara otter."

The yapock measures from ten to fourteen inches long in the head and body, the tail being rather more. The limbs are short, and the contour of the body elongated. The ears are moderate, the nose pointed; the fur of the body close, short, somewhat crisped and glossy; the tail, excepting at the base, is scaly, the scales being spirally arranged and interspersed with fine, short, bristly hairs. The fore-feet are divided into five long and slender toes, armed with small weak claws, the innermost or thumb excepted, which has a flat nail. It is not opposable, though placed rather behind the general line of the other toes. On the outside of the wrist there is an elongated tubercle (the pisiform bone developed) resembling a sixth finger, the use of which is not apparent. The hind feet, which are broad, are each divided into five toes, tied together by ample webs; the claws are small; the inner toe has a flat nail. This curious animal is furnished with cheek-pouches of great size, which extend far back along the sides of the mouth, and this circumstance, as Mr. Ogilby remarks, "hitherto unobserved by zoologists, throws considerable light upon the habits of this rare animal, which thus appears, like the ornithorhynchus, to feed upon fresh-water crustacea, the larvæ of insects, the spawn of fishes, &c., which it probably stows away in its capacious cheek-pouches." Small fishes are doubtless among its prey.

The yapock, unlike the opossums, is incapable of climbing: it is an aquatic animal, like the otter, and lives in holes along the banks of the rivers which it frequents, and in which it seeks its food. It is said to take its young early to the water. Two specimens in the possession of the celebrated naturalist M. Natterer, were caught near water not far distant from Rio Janeiro, and a third was captured alive near Para, in a basket similar to those used in this country for catching eels. It had made its way through the funnel-shaped entrance, under water, and could not return.

The dentition of the yapock differs in some points from that of the opossums: the incisor and canine teeth are the same in both, but the molars are only five on each side, two false and three true, both in the upper and under jaw. The ground colour of the upper surface is dusky black; a white semilunar mark passes from ear to ear across the forehead; on each side are four large transverse marks of delicate grey, one on the scapula, and three on the sides of the body, forming bands interrupted or rendered incomplete by a middle dorsal line. The under surface is white, the tail is black, its tip (the extent varying from half an inch to three or four inches) being white.

---

[*] *Marsupium*, a purse or pouch.

66.—The Brush-tailed Phascogale

(*Phascogale penicillata*). This animal, the "Tapoa tafa" of White, is a native of Australia. It is found throughout the colony of New South Wales, and is common on Liverpool Plains; Mr. Gould saw it also at Adelaide, in South Australia, where it frequently enters the houses. It is arboreal in its habits, and feeds on small birds, insects, &c.; but little is known respecting its general economy.

The brush-tailed phascogale belongs to the family of Dasyuridæ. In size it exceeds the common brown rat of our country; its tail is very bushy, and is probably used to assist in climbing. The fur of the body is long, full, soft, and loose; the general colour above is grey; the under parts are white.

67.—The Ursine Opossum

(*Dasyurus ursinus*). In their dental system the animals of this genus (Dasyurus) approach the American opossums; they differ, however, in having only eight incisors in the upper jaw, and six in the lower. The canines are large; the false molars are two on each side, above and below; the true molars four. Dental formula: Incisors $\frac{8}{6}$, canines, $\frac{1-1}{1-1}$, molars $\frac{6-6}{6-6} = 42$. (See figure 68.) All the animals of this genus are Australian.

The ursine dasyurus, or opossum, is a native of Van Diemen's Land, and is called by the colonists the *native devil*, by which name it was known upwards of thirty years back. Instead of being slender and active, as are the Dasyuri generally, this animal is thickset in its proportions and heavy in its movements. Its shape is not unlike that of a badger, but the head is thick, the muzzle short and stout, the eyes small, the mouth wide. The limbs are short, robust, and clumsy; the toes, five on the fore feet, four on the hind, are armed with large claws well adapted for burrowing. The heel is produced, and the sole is naked and callous, indicating a plantigrade step and heavy pace.

Like the bear, which it resembles in its actions and gait, the ursine opossum sits up on its haunches, and frequently uses its paws in conveying food to the mouth. Its voice is a hollow barking growl. The female produces four or five young at a birth: as in all the Marsupials, they are rudimentary, small, naked, and blind, and in this stage of their existence are found firmly adhering to the teats of the mother.

The ursine opossum measures twenty-one inches in length, exclusive of the tail, which is seven inches. The fur of the body is rather long, harsh, and black; a white gorget is conspicuous on the chest, and a white transverse mark often crosses the haunches. This animal is stupid and voracious in the extreme. Its habits are nocturnal, and it frequents the shore of the sea, feeding upon mollusca, carrion, &c. The flocks of the colonists in Van Diemen's Land, and domestic poultry, suffer from its ravages. During the day it conceals itself in burrows or holes in the ground.

Mr. Harris, who first described this species under the name of *Didelphis ursina*, says, "These animals were very common on our first settling at Hobart Town, and were particularly destructive to poultry, &c. They however furnished the convicts with a fresh meal, and the taste was said to be not unlike veal. As the settlement increased, and the ground became cleared, they were driven from their haunts near the town, to the deeper recesses of the forests yet unexplored. They are however easily procured by setting a trap in the most unfrequented parts of the woods, baited with raw flesh. all kinds of which they eat indiscriminately and voraciously. They also, it is probable, prey on dead fish, blubber &c., as their tracks are frequently found on the sands of the sea-shore. In a state of confinement, they appear to be untamebly savage, biting severely, and uttering at the same time a low yelling growl." We have had frequent opportunities of observing the ursine opossum in captivity. Its heavy head and wide mouth give it a peculiar expression of ferocity unmingled with the slightest intelligence. When roused from its lethargy, it instantly displays its formidable teeth, ready to bite in a moment. It neither acknowledges its keepers nor those who habitually feed it: it keeps in the darkest part of the den, and the nictitating membrane of the eye is in perpetual motion, an indication that light is distressing. It feeds indiscriminately on bread and milk, and flesh. From the strength of its jaws, and the severity of its bite, the ursine opossum is more than a match for an ordinary dog, and, as Mr. Gunn states, is the most destructive animal to sheep in the colony. It is fierce, and defends itself obstinately.

69.—The Dog-head Thylacinus

(*Thylacinus Cynocephalus*). This animal, called zebra opossum, and zebra wolf, tiger, hyæna, &c., is a native of Van Diemen's Land, where fortunately it is much rarer than the ursine opossum, otherwise it would prove a greater pest, from its size and strength. In stature it nearly equals a wolf; the head much resembles that of a dog, but the mouth is wider; the tail is thick at the base, becoming more slender to the point: it is covered with short close hairs of a brown colour. The general fur is short and smooth, of a dusky yellowish brown barred or zebraed on the lower part of the back and rump with about sixteen black transverse stripes, broadest on the back and gradually tapering downwards, two of which extend a considerable way down the thighs. The ground-colour of the back has a tint of dusky grey. The eyes are large, full, and black. Length of head and body of adult male, nearly four feet; of the tail two feet; average height of back one foot ten or eleven inches. In the specimens we have examined, the tail appeared compressed, as was observed by Mr. Harris, its original describer. Mr. Gunn, however, in the 'Magazine of Natural History,' contradicts this part of Mr. Harris's statement.

Dental formula:—incisors, $\frac{8}{6}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{7-7}{7-7} = 46$.

The toes are 5 on the fore-feet, 4 on the hind-feet; the claws are blunt as in the dog: a narrow naked line runs up the back of the wrist from the ball, and also up the metatarsus of the hind limbs, to half the distance between the ball or pad and the heel.

In its habits the dog-headed thylacinus is nocturnal, remaining concealed during the day in the caverns and fissures of the rocks, in the deep and almost impenetrable glens among the highest mountains of Van Diemen's Land. Like the ursine opossum it is distressed by the light, and brings the nictitating membrane of the eyes into perpetual use. During the night it prowls, hyæna-like, in quest of prey. The bush kangaroo and other animals it destroys, and even manages to eat the spine-covered echidna (or porcupine anteater), which is so protected by its panoply of spears as to seem almost invulnerable. An individual was caught by Mr. Harris in a trap baited with kangaroo flesh; it lived but a few hours, having received some internal hurt in securing it, and appeared to be stupid, inactive, and ferocious, uttering from time to time a short guttural cry: like the owl, it was constantly drawing and undrawing the nictitating membrane of the eye. In its stomach was found the partly-digested remains of a porcupine anteater. Mr. Gunn (see 'Annals of Natural History' for 1838, vol. i., p. 101) informs us that the thylacinus is common in the more remote parts of the colony, and is often caught at Woolnorth and Hampshire Hills. It usually attacks sheep in the night, but is also seen during the daytime, upon which occasions, perhaps from its imperfect vision by day, its pace is very slow. We are not aware that this animal has ever been brought alive to Europe.

70, 71.—The Long-nosed Bandicoot

(*Perameles nasuta*). The Bandicoots appear to take in Australia the place of the shrews, tenrecs, and other Insectivora in the old world. Closely allied in the structure of their organs of locomotion to the kangaroos, yet in their system of dentition they exhibit a remarkable difference. In this latter point they in some respects approach the opossums (Didelphis), and the characters of the teeth indicate an insectivorous appetite. Above the incisors are 10 in number, of these the outermost on each side is conical and apart from the rest. The canines are curved and stand isolated; the molars on each side are 7, of which the 3 first are false, compressed, and sharp. The four true molars are crowned with sharp tubercles. Below the incisors are 6 in close array, and projecting obliquely. The canines and molars are as in the upper jaw.

Dental formulo:—incisors, $\frac{10}{6}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{7-7}{7-7}=48$, (See fig. 72).

The general contour and form of the bandicoots is rabbit like, but the muzzle is elongated, narrow, and pointed, the nose advancing considerably beyond the jaw. The fore-feet are divided into five toes, of these the innermost is rudimentary, and the outermost a mere cubercle, having a minute nail. The three middle toes are large, and armed with strong claws. The hinder limbs, though not developed to the same proportionate extent as in the kangaroos, exceed the fore-limbs. The metatarsus is elongated and naked beneath; the toes are four in number, viz., on the inner side, two toes joined in common integument, as in the kangaroos, each furnished with its distinct claw; a large and robust middle toe, with a straight strong pointed claw, and a small outer toe also armed with a straight claw.

Though the system of dentition in the bandicoots is insectivorous, they do not refuse vegetable aliment; they live in burrows, for the digging of which their fore-paws are well adapted. In their movements these animals resemble a rabbit; they do not, like the kangaroo, bound from the hind limbs alone, but arching the back, proceed with a saltigrade gait, that is half way between running and jumping; or rather by a succession of short leaps from the hind to the fore feet, but not with much speed, nor maintained for a great length of time. The kangaroos make considerable use of the tail, but in the bandicoots it is by no means so important an organ, though it assists them in sitting upright, an attitude usually assumed when eating, the fore-paws being brought into use as holders, like those of the squirrel. With these paws they scratch up the earth in search of roots and insects, and it is said that the potato crops of the colonists in some districts suffer from their incursions. They are readily tamed, and in a few days become reconciled and familiar. Five species are now known: of these one is a native of New Guinea. The long-nosed bandicoot is found in New South Wales. It measures about 16 inches in the length of the head and body, and 5 in that of the tail. The ears are erect, pointed, and covered with short hair; the eyes are very small; the nose remarkably long, pointed and naked at the extremity. The tail is slender, and though better covered with hair, bears some resemblance to that of a large rat. The hair is of two kinds, an upper and under coat; the hairs forming the upper or external coat are coarse and harsh. In colour it resembles the rat, excepting that it is of a more sandy shade on the upper parts of the body, and of a more clear silvery white beneath. The under-coat, concealed by this outer garment, consists of soft ash-coloured wool or fur, well calculated to protect the animal from cold and variations of temperature; for it appears to be an inhabitant of the mountain districts of Australia, principally, if not exclusively.

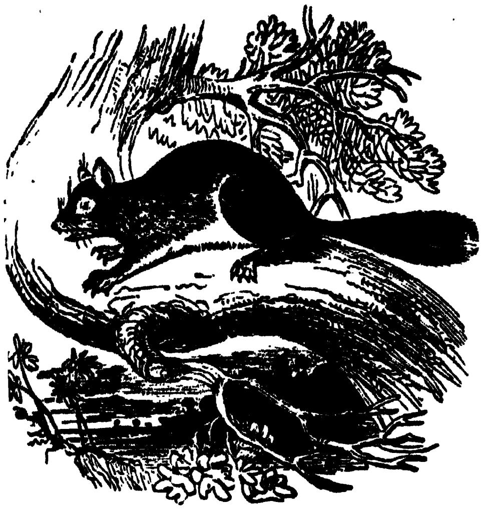
The form and characters of its teeth would lead us to suppose that it fed almost entirely upon insects and similar creatures; and M. Geoffroy even imagines that it may use its long snout for the purpose of rooting up the earth like a pig in search of worms and grubs. The colonists however assert that these bandicoots are chiefly if not purely herbivorous, and that the principal part of their food consists of roots, which they dig up with their sharp and powerful claws. In the neighbourhood of human habitations they frequently enter into the granaries, and do as much mischief to the corn as the rats and mice of our own country. The Australians have however one advantage over the European farmers in this respect: the bandicoot is more easily excluded than the rat, for it cannot, like that destructive species of vermin, eat its way through the planks and timbers, and still less through the brick walls of the buildings. It is probably from this habit of committing petty depredations upon the farm-yards and granaries, as well as from the general similarity of their external appearance, that the colonists of New South Wales sometimes confound the bandicoots with various species of murine animals originally found in the country under the common denomination of native rats and mice. Nor is it at all improbable, notwithstanding the assertion of the colonists to the contrary, that M. Geoffroy's conjecture as to the insectivorous habits of this animal may be at least partly if not entirely true. The common rat, with teeth much less adapted for living upon flesh than those of the bandicoots, is well known to have decidedly carnivorous propensities; and, as M. Geoffry very correctly observes, it is seldom that analogous forms of dentition fail to indicate analogous appetites.

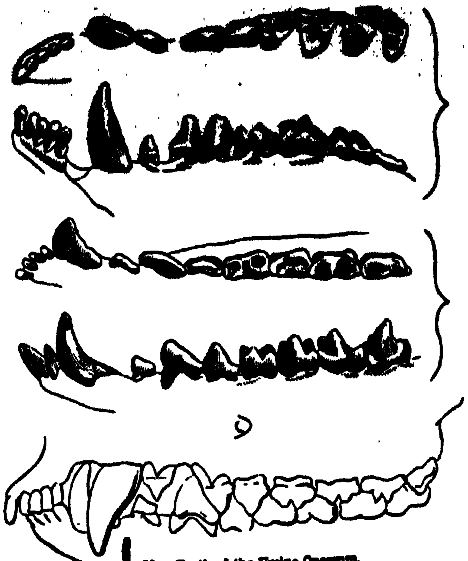
The insectivorous hedgehog eats the root of the plantain, boring with its snout under the plant so as to get fairly at it, leaving the leaves untouched.

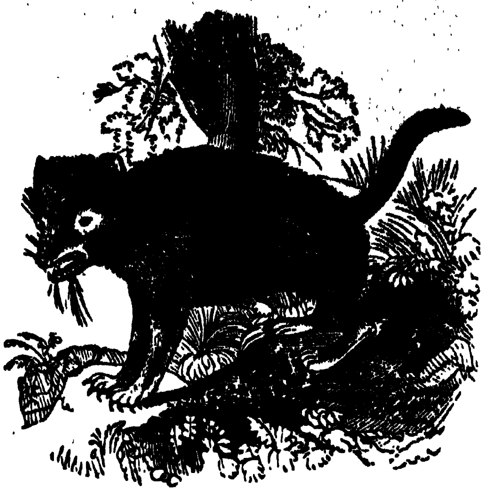
73.—The Chæropus

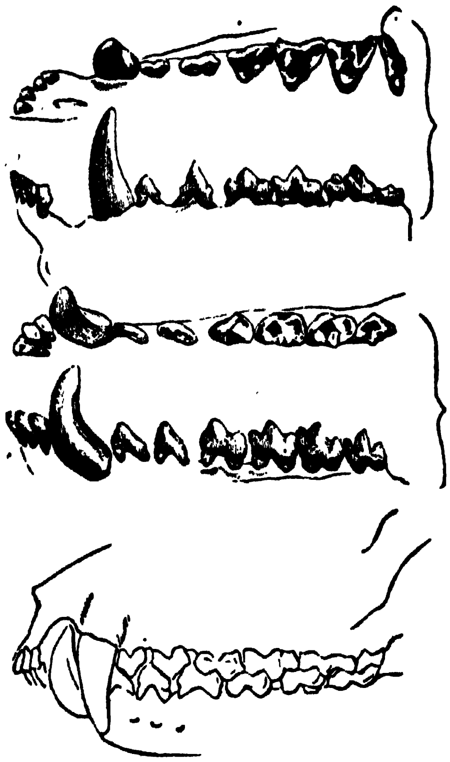
(*Chæropus ecaudatus*, Ogilby). This animal, which is closely allied to the bandicoots, was first described by Mr. Ogilby (March, 1838) from a drawing made by Sir Thomas Mitchell. The animal was found by that officer on the banks of the river Murray during his expedition into the interior of New South Wales. The following is from his journal:—

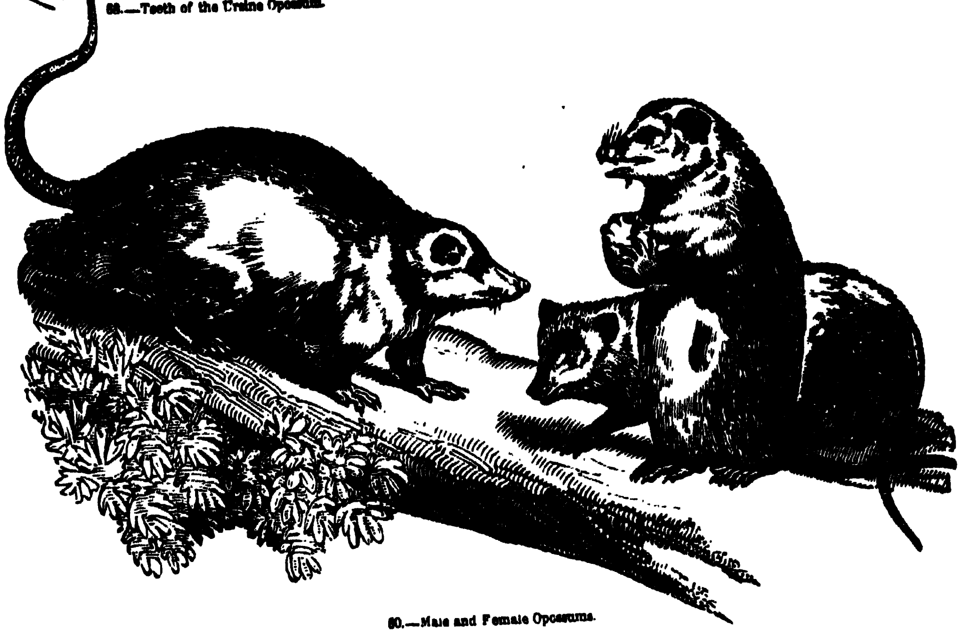
"June 16, 1836. The most remarkable incident of this day's journey was the discovery of an animal of which I had seen only a head in a fossil state in

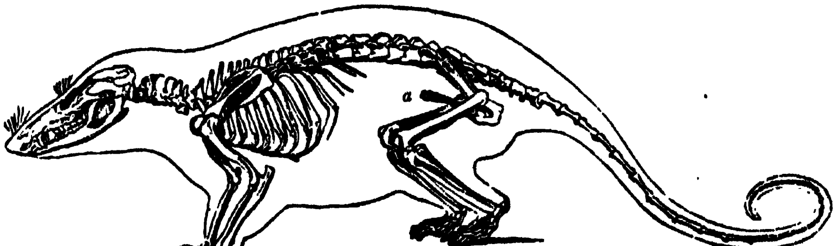

56.—Brush-tailed Phascogale.


58.—Teeth of the Ursine Opossum.


57.—Ursine Opossum.


62.—Teeth of Virginian Opossum.


60.—Male and Female Opossums.



63.—Skeleton of Virginian Opossum. a. The Marsupial Bones.

61.—Virginian Opossum

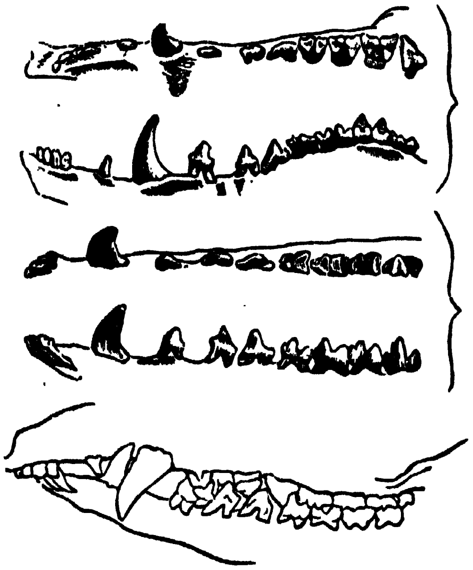
6[illegible] Opossum.

6[illegible].—Dog-head Thylacinus.

71.—Long-nosed Bandicoot.

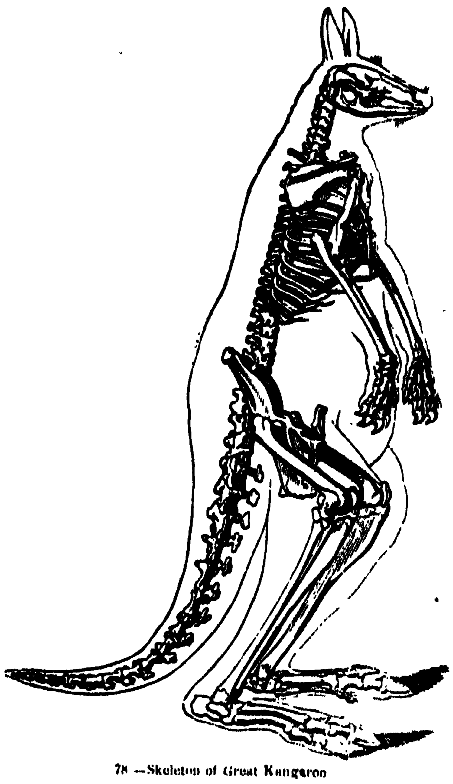
70.—Long-nosed Bandicoot.

68.—Yapock Opossum.

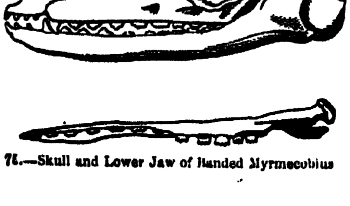


72.—Teeth of Long-nosed Bandicoot.

77.—Great Kangaroo.

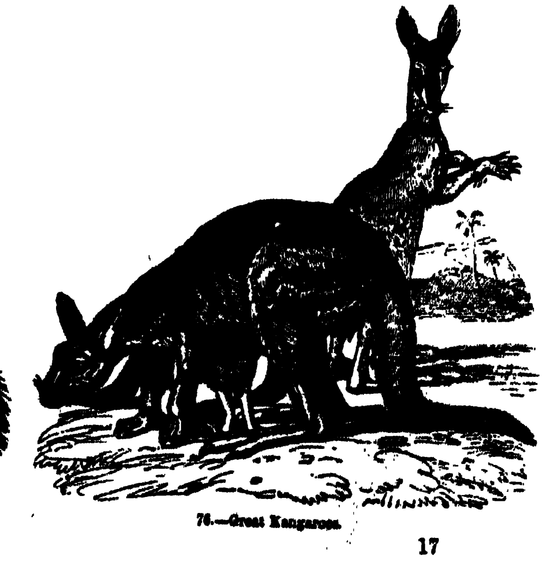


78.—Skeleton of Great Kangaroo

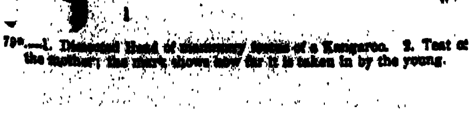


75.—Skull and Lower Jaw of Banded Myrmecobius

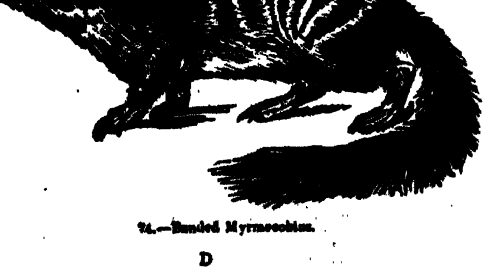
73.—Chæropus.



76.—Great Kangaroos.



79*.—1. Dissected Head of mammary fœtus of a Kangaroo. 2. Teat of the mother; the mark shows how far it is taken in by the young.



74.—Banded Myrmecobius.

D

the limestone caves of Wellington Valley, where, from its very singular form, I supposed it to belong to some extinct species. The chief peculiarity then observed was the broad head and very long slender snout, which resembled the narrow neck of a wide bottle; but in the living animal the absence of a tail was still more remarkable. The feet, and especially the fore-legs, were also singularly formed, the latter resembling those of a pig; and the marsupial opening was downwards, and not upwards, as in the kangaroo and others of that class of animals. This quadruped was discovered by the natives on the ground, but on being chased it sought refuge in a hollow tree, from which they took it alive, all of them declaring that they had never before seen an animal of the kind. This was where the party had commenced the journey up the left bank of the Murray, immediately after crossing that river."

The specimen was presented to the museum at Sydney.

The drawing of the fore-foot very closely resembles that of the pig: two toes are represented short and of equal length, with hoof-like claws; but there is a swelling at the base of the first phalanges, which renders it probable that there may be two rudimentary ones also present. The form and characters of the hind-feet are perfectly similar to those of Perameles, as are also the teeth, as far as Mr. Ogilby could judge from the drawing, except that the canines appeared much smaller. The ears are long, elliptical, and nearly naked; the head broad; the muzzle long and pointed; the body is described as being about the size of that of a small rabbit, and the fur much of the same colour and quality as in that animal. (See *Proceed. Zool. Soc. Lond.*, March, 1838.) Most probably, in its habits and manners, the animal resembles the bandicoots, but we must wait for definite information before we can speak positively.

74. The Banded Myrmecobius

(*Myrmecobius fasciatus*). This elegant little creature is the example of a new genus recently described by Mr. Waterhouse. It is thus characterized:—Fore-feet with five toes, hind-feet with four toes, all free; head elongated, snout produced; ears moderate, subacute; body slender; tail rather long.

Dental formula:—incisors, $\frac{8}{6}$; canines, $\frac{1-1}{1-1}$; false molars, $\frac{4-4}{5-5}$; true molars, $\frac{4-4}{4-4} = 52$. The teeth are minute and insectivorous in their character; and the branch of the lower jaw (see fig. 75) is twisted in such a manner, that the outer surfaces of the true molars come in contact with the masticating surface of those of the upper jaw. The toes are armed with strong curved claws.

The banded Myrmecobius is about the size of a squirrel. The fore part of the body is reddish, gradually blended into the black, which is the prevailing colour of the posterior half, and which is adorned with nine white bands. Fur of two kinds. Under hair scanty and whitish grey; upper hair rather coarse, short, and adpressed on the anterior parts; long on the posterior and under parts; hairs on the anterior part of the back generally black at the base and fulvous at the apex; those on the head very short, brownish above, being composed of a mixture of black, fulvous, and a few white hairs; a few black hairs spring from the sides of the muzzle and under each eye; hair of the tail long and rather bushy; most of the hairs on the under part fulvous at the base and white at the tip; those on the under side of the tail generally black at the base and white at the apex. Length from nose to root of tail, ten inches; length of tail to the end of the hair, seven inches.

It is a native of the district bordering the Swan River.

"This beautiful and interesting little animal," observes Mr. Waterhouse, "was first discovered by Lieut. Dale whilst on an exploring party in the interior of the country at the Swan River settlement, and was discovered about 90 miles to the south-east of that river. Two of these animals, says Lieut. Dale, were seen within a few miles of each other; they were first observed on the ground, and on being pursued, both directed their flight to some hollow trees which were near. We succeeded in capturing one of them; the other was unfortunately burnt to death in our endeavour to dislodge it by fumigating the hollow tree in which it had taken refuge. The country in which they were found abounded in decayed trees and ant-hills. A second specimen has since been brought to England and placed in my hands for examination. I was informed this was brought from Van Diemen's Land; but Mr. Alexander Gordon, who had sent the specimen to England to be stuffed, has since assured me that I was misinformed, he having himself procured the animal at Swan River."

76, 77.—The Great Kangaroo

(*Macropus major*, and *M. Giganteus*, Shaw). The general aspect of the kangaroos is very peculiar; the anterior parts of the body are light and flexible, and the fore limbs are small. In contrast with these characters is the vast development of the hinder quarters, the haunch, hind limbs, and tail; parts of the frame in which the muscular power of the animals is concentrated.

The hinder limbs are voluminous and long: the metatarsus is produced, and furnished beneath with a naked callous pad, running from the toes to the heel. The ordinary attitude of the kangaroos is upright, with a forward inclination, the weight resting on the hind limbs, the long sole (or metatarsus) of which is applied to the ground, and also on the tail, which with the limbs forms a tripod for the support of the body. The chest is contracted, the body tapering from the haunches to the neck, the contour being pyramidal. The head is well proportioned and delicately turned. The fore-paws have 5 toes armed with strong sharp claws; the hind feet are divided into four toes; of which the two innermost are very small, and compacted together so as to appear as one; but the slender bones of each and the claws are distinct. The third or middle toe is and powerful, well padded beneath, and armed with a strong hoof-like nail. The outer toe is less than the middle, but larger than the two inner toes together; its nail is in proportion. The eyes are full; the ears rather large; the upper lip is cleft. There are perfect clavicles, and the arm enjoys considerable freedom of motion.

The skeleton of the Great Kangaroo (fig. 78) well displays the difference in the development of the limbs, and the solidity of the osseous structure of the tail, which is clothed with voluminous muscles.

The dentition in the genus Macropus is as follows:—The incisors of the upper jaw are 6 in number; the lateral one on each side being the largest and furrowed. Between the incisors and the molars there exists a large unfilled space. The molars are five on each side, but the first is a false molar, and often wanting, being pushed out by the advance of those behind as the posterior ones rise from their sockets. In the under jaw the incisors are 2, long, powerful, and pointed; they advance horizontally forwards, and have a sharp oblique external edge opposed to the edge of the upper incisors.

The molars as in the upper jaw, and also rough, with two transverse sharp prominences, which wear gradually down, showing a fold of enamel encircling an osseous centre. Fred. Cuvier divided from the genus Macropus those kangaroos which had shorter ears, and a nearly naked tail, though, as in fig. 79, their dentition is the same. He placed them in a genus which he termed Halmaturus.

Dental formula:—incisors $\frac{6}{2}$; canines, $\frac{0-0}{0-0}$; molars, $\frac{5-5}{5-5} = 28$.

The ordinary mode of progression in these animals, as well as their flight from enemies, is by a series of bounds, often of prodigious extent. They spring from their hind limbs alone, neither the tail nor the fore limbs being in requisition. In feeding they assume a crouching hare-like position, resting on the fore-paws as well as on the hinder extremities while they browze on the herbage. In this attitude they hop gently along, the tail being pressed to the ground. On the least alarm, however, they rise on their hind limbs and bound to a distance with great rapidity. Sometimes, when excited, the old male of the Great Kangaroo stands on tiptoe and on his tail, and is then of prodigious height. In fighting he balances himself for a moment on the tail, and strikes forward with both the hind legs, using his fore paws at the same time. The blows given by the hind feet are terribly effective.

The diet of the kangaroo is exclusively herbaceous; the stomach is very large and sacculated, and balls of hair, similar to those so often occurring in the stomach of cows and oxen, have in a few instances been found in it. These balls, as was observed by Mr. Owen, are entirely composed of the hairs of the animal matted together, and agglutinated by the mucus of the stomach. With the complexity of the stomach of the kangaroos is associated the act of rumination. The kangaroo ruminates while in its erect attitude; but this act by no means takes place with the same frequency and regularity as in the true ruminants, viz., the ox or deer.

The Great Kangaroo (the Boomer, Forester, and Old Man Kangaroo of the colonists; Bundaary of the aborigines) is extensively spread in New Holland, in the intermediate country between New South Wales and South Australia, and also in Van Diemen's Land. It was first discovered by the celebrated navigator Captain Cook in 1770, while stationed on the coast of New South Wales.

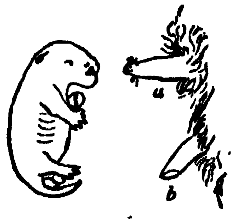
The Great Kangaroo is not strictly speaking gregarious; more than six or eight are seldom seen together; most frequently it is met with singly or in pairs. The kind of country which it prefers consists of low grassy hills and plains skirted by thin open forests of brushwood, to which Mr. Gould says it resorts for shelter from the oppressive heat of the mid-day sun. That it would bear, if naturalised, the severities of our winter, is beyond a doubt, since in Van Diemen's Land, among other places, it resorts to the bleak, wet, and frequently snow-capped summit of Mount Wellington.

The male greatly exceeds the female in size, measuring 7 feet 10 inches from the nose to the extremity of the tail, the length of the latter being little more than 3 feet. Instances have occurred of the weight being 220 pounds. The general colour is uniform greyish brown, grizzled on the arm and under surface. A whitish mark runs above the upper lip, and is faintly traceable along the sides of the face. The hands, feet, and tip of the tail are black.

The kangaroo readily takes to the water, and swims well. It often resorts to this mode of escaping from enemies, among which is the dingo, or Australian dog. Man, however, is the most unrelenting foe of this inoffensive animal. The native employs several modes of obtaining it. Sometimes he steals upon it, under the covert of the trees and bushes, till within range of his unerring spear. Sometimes numbers of men unite in a large party, and, forming a circle, gradually close in upon the animals with shouts and yells, by which the animals are so terrified and confused, that they easily become victims to the bommerengs, clubs, and spears which are directed from all sides against them. The colonist employs the gun, and a breed of dogs between the greyhound and bulldog, fierce, powerful, and very fleet, for the course. Many of these dogs, says Mr. Gould, are kept at the stock-stations of the interior for the sole purpose of running the kangaroo and the emu. The latter is killed solely for the supply of oil which it yields, and the former for mere sport, or for food for the dogs. "Although," he adds, "I have killed the largest males with a single dog, it is not advisable to attempt this, as they possess great power, and frequently rip up the dogs, and sometimes cut them to the heart with a single stroke of the hind leg. Three or four dogs are generally laid on, one of superior fleetness to *pull* the kangaroo, while the others rush in upon and kill it. It sometimes adopts a singular mode of defending itself by clasping its short but powerful arms around its antagonist, leaping away with it to the nearest water-hole, and there keeping it beneath the surface until drowned. With dogs the old males will do this whenever they have an opportunity, and it is also said they will attempt the same with man."

In Van Diemen's Land the Great Kangaroo is regularly hunted with foxhounds, as the deer or fox in England. The sport is said to be excellent. Mr. Gregson says, in a letter to Mr. Gould, "I recollect one day in particular when a very fine boomer jumped up in the very middle of the hounds, in the *open*. He at first took a few high jumps with his head up, and then, without a moment's hesitation, he stooped forward, and shot away from the hounds apparently without effort, and gave us the longest run I ever saw after a kangaroo. He ran fourteen miles by the map, from point to point, and if he had had fair play, I have little doubt that he would have beat us. But he had taken along a tongue of land that ran into the sea, so that on being hard pressed, he was forced to try to swim across the arm of the sea, which cannot have been less than two miles broad. In spite of a fresh breeze and a head-sea against him, he got fully half-way over; but he could not make head against the waves any farther, and was obliged to turn back, when, being quite exhausted, he was soon killed. The distance he ran, taking the different bends of the line, was not less than eighteen miles." He was far before the hounds, and quite fresh when he took to the water. His hind quarters weighed nearly seventy pounds. "We did not measure the distance of the hop of this kangaroo, but on another occasion, in which the boomer had taken along the beach, and left his prints in the sand, the length of each jump was found to be fifteen feet, and as regular as if they had been stepped by a sergeant. When a boomer is pressed, he is very apt to take to the water, and then it requires several good dogs to kill him; for he stands waiting for them, and as they swim up to the attack, he takes hold of them with his fore feet, and holds them under water. The buck is very bold, and will generally make a stout resistance; for, if he cannot get to the water, he will place his back against a tree, so that he cannot be attacked from behind, and then the best dog will find him a formidable antagonist. The doe, on the contrary, is a very timid creature; and I have even seen one die of fear."

The period of gestation in the kangaroo is thirty-nine days. The appearances presented by the young one twelve hours after birth, and adhering to the teat of the mother, within the pouch, are thus described by Mr. Owen:—"It resembled an earth-worm in the colour and semi-transparency of its integument, adhered firmly to the point of the nipple, breathed strongly but slowly, and moved its fore-legs when disturbed. Its body was bent upon the abdomen, its short tail tucked in between the hind legs, which were one-third shorter than the fore-legs, but with the three divisions of the toes now distinct. The whole length from the nose to the end of the tail when stretched out did not exceed one inch and two lines"



Outline of the kangaroo about twelve hours after birth, showing its natural size and external development at this period. *a*, the upper nipple of the left side, to which it was attached; *b*, the lower nipple of the same side.

Though enabled by means of its lips to grasp the nipple with considerable firmness, the unaided efforts of the young one could not draw nutriment thence, and consequently the mammary gland is acted upon by a peculiar muscle, which, compressing it, forces out the milk into the mouth of the young. Mr. Owen remarks, that it can scarcely be supposed that the efforts of suction should always be coincident with the successive jets of milk, and that there might arise danger from the flow of milk into the little creature's larynx. To remedy this there is a special contrivance, first described by Geoffroy, but which was not unnoticed by Hunter, as evidenced by preparations of the larynx and throat of two young kangaroos in the museum of the Royal College of Surgeons. (Fig. 79.*)

"Thus aided and protected by modifications of structure," continues Professor Owen, "both in the system of the mother and in its own, designed with especial reference to each other's peculiar condition, and affording, therefore, the most irrefragable evidence of creative foresight, the feeble offspring continues to increase from sustenance exclusively derived from the mother for a period of about eight months. The young kangaroo may then be seen frequently to protrude its head from the mouth of the pouch, and to crop the grass at the same time that the mother is browsing. Having thus acquired additional strength, it quits the pouch, and hops at first with a feeble and vacillating gait, but continues to return to the pouch for occasional shelter and supplies of food till it has attained the weight of ten pounds. After this it will occasionally insert its head for the purpose of sucking, notwithstanding another fœtus may have been deposited in the pouch, for the latter, as we have seen, attaches itself to a different nipple from the one which had been previously in use."

80.—The Kangaroo Rat, or Potoroo

(*Hypsiprymnus murinus*, Pander and D'Alton). The Bettong of the natives of New South Wales.

It is principally in their dentition, and in the elongated narrow form of the head, that the little animals of the genus *Hypsiprymnus* differ from the kangaroos. There are canines in the upper jaw. The dental formula is as follows (see figure 81): incisors, $\frac{6}{2}$; canines, $\frac{1-1}{0-0}$; molars, $\frac{5-5}{5-5} = 30$. Figure 82 represents the skull, the elongated contour of which is very conspicuous.

The Potoroo (the Macropus minor of Shaw, H. setosus of Ogilby; H. Peronii, Quoy and Gaimard); is about the size of a rabbit, measuring fifteen inches from the nose to the root of the tail, the latter being ten inches and a half in length. The general colour of the fur is brown; on the back blackish, pencilled with brownish-white. Lips, chin, throat, and under parts of the body dirty-white; fore-feet brown; ears rounded, and well covered with hair; tail scaled, and sparingly clothed with short decumbent hairs, which (excepting at the base and extreme point) are of a black colour on the upper part and sides of the tail. The hairs on the under side are brown; and at the tip there are a few dirty-white hairs.

The Potoroo is common in New South Wales. It is timid and inoffensive, feeding on vegetables, and proceeding in the manner of the kangaroo. Of its habits little is known. It frequents the precincts of scrubs and patches of brushwood, and scratches up the ground in quest of roots. These animals are found to be very destructive to the potato crops, and are very readily caught by baiting traps with this vegetable.

Several other species have been described.

83.—The Sooty Tapoa

(*Phalangista fuliginosa*). This animal presents us with the example of a group termed Phalangers (genus *Phalangista*); but they are often, but erroneously, called opossums in the writings of travellers and persons not conversant with natural history.

The Phalangers of Australia have six incisors above, of which the two middle are the largest; and in the lower jaw are two long obliquely projecting incisors, which are met by the corresponding incisors of each side. There is a small canine on each side in the upper jaw only. The molars on each side, above and below, are five, of which the first is a false molar. These are the constant teeth, but besides there are in some species little additional molars, sometimes canine-like molars, in front of the contiguous and constant series. The number of these additional teeth varies in the same individual on different sides of the jaw. Dental formula: incisors, $\frac{6}{2}$; canines, $\frac{1-1}{0-0}$; molars, $\frac{5-5}{5-5}$; additional inconstant molars, $\frac{1-1}{2-2}$, or $\frac{2-2}{3-3}$, or $\frac{1-1}{1-1}$, or $\frac{3-3}{2-2}$. (See figure 84.) The head is somewhat elongated, the forehead slightly arched; the mouth moderate. The feet have five toes; those of the fore-feet are armed with strong hooked claws; those of the hind-feet consist of four true toes, and a large thumb destitute of a nail, and very distinct from the rest, of which the two innermost are shorter than the two outermost, and are united together to the base of the claws. The tail is long and prehensile, well furred, excepting at the extreme point and part of the apical portion beneath, which is bare to a greater or less extent. We may here observe that the Phalangers form three sections or subgenera. The first (*Phalangista*) is exclusively Australian, and has the tail naked beneath only at the tip. The second section comprehends a group (*Cuscus*) distinguished by having the tail throughout the greater part of its extent beneath naked, scaly, and highly prehensile. The ears are short and close. These animals inhabit the Celebes and Moluccas, where they are called Couscous, or Coëscoës. The third group (*Pseudochеirus*, Ogilby) has the tail less densely clothed than in Phalangista proper: the apical portion is naked beneath; the fore-feet, with the two united inner toes, slightly opposed to the others.

Besides these, are the Flying Phalangers, constituting a distinct genus, *Petaurus*. The true Phalangers, of which we figure the Sooty Tapoa and the Vulpine Phalanger (Ph. vulpina), are animals of arboreal habits, residing almost constantly among the branches. Their food consists principally of fruits, buds, leaves, &c., but insects, eggs, &c. are also eaten. Night is their season of activity; during the day they conceal themselves in the hollows of trees, or lie close on the branches, hidden by the foliage. The number of young which the females produce at a birth appears to be two, at least if the account of Mr. Bennett (see 'Wanderings in New South Wales') is to be taken as a criterion. He states that on one occasion he was present when a number of flying squirrels (viz., flying phalangers), opossums (phalangers), bandicoots, snakes, &c., were caught by the natives during what he terms a hunting expedition, and that one of the opossums among the game was a female, and had two large-sized young ones in her pouch.

Though the Phalangers are at ease among the branches, the motions of these animals, generally speaking, are not distinguished by that nimbleness and rapidity which we so much admire in the squirrel. On the contrary, their motions are slow and cautious, and they use their prehensile tail as an additional security. When in danger of discovery, they are said to suspend themselves by the tail, hanging, head downwards, motionless as if dead; and this is more remarkably the case with the Couscous of the Moluccas. It is, indeed, reported, that if a man fix his eyes on one thus counterfeiting death, it will continue to hang till, no longer able to sustain the weight, the muscles of the tail relax with extreme fatigue, and the animal falls to the ground. Few animals have more soft and delicately woolly fur than the Phalangers; their skins are consequently highly prized by the aborigines, as well as their flesh, which is eaten with avidity, and doubtless is not inferior to that of the kangaroo.

Like many of the Marsupials, the Phalangers have an unpleasant smell, owing to a fluid secreted in certain glands; but this does not affect the delicacy and flavour of the flesh.

In captivity the Phalangers are not very attractive: during the day they slumber concealed among the hay or other bedding of their cage, shrouding themselves from observation, and are impatient of interruption; they do not, however, attempt to bite, and appear as stupid as they are sluggish: their form however, is graceful, and their fur sets them off to much advantage. When feeding they sit up like the squirrel, holding the article of which they are partaking between the fore-paws. During the night they traverse their cage, take their food, and enjoy the active hours of their existence. We know of no instance in which they have bred in Europe; but as the kangaroo produces young in our climate, it is not improbable that under favourable circumstances these animals also might multiply in our extensive menageries, especially as they appear to bear our climate very well, care being taken against their exposure to the severities of the weather.

The following description of the Sooty Tapoa was taken from a living specimen:—"The shape and proportions of *Phalangista fuliginosa* are those of the *Phal. vulpina:* the ears are also of similar shape and size, hairy on the outsides, but naked within. The colour is a uniform sooty-brown over all parts of the head and body, not even excepting the belly and the inner surface of the thighs. The hair has a frizzled appearance, but it is not so close nor so fine as in *Phal. vulpina.* The tail is long, black, and rather bushy; the *naked slip* underneath, as well as the nose and soles of the feet, which are also naked, is of a bright flesh colour. The moustaches are large, stiff, and black." The individual was said to have been brought from Sydney. In the museum of the Zoological Society are seven or eight distinct species of this genus.

85.—The Vulpine Phalanger

(*Phalangista vulpina*). Of all the species the Vulpine Phalanger is probably the most carnivorous. The female is destitute of a true pouch, and the teats are two in number. The Vulpine Phalanger is about the size of a cat; in captivity it displays but little to interest ordinary observers, the day being passed in sleep; nor, when roused up by the approach of night, is it remarkable for activity or alertness. Its fur is soft, fine, and woolly; the predominating tint is greyish brown, passing into a yellowish-grey on the shoulders; the tail is covered with long black fur, excepting along a line on the under side at the tip, which is naked. It is a native of New South Wales, and also of Van Diemen's Land, where it is common. The tint of colouring is subject to considerable variation as respects intensity, intermediate shades being observable between the ordinary grey specimens and the Sooty Tapoa, which is regarded as a distinct species. The native name of the Vulpine Phalanger, according to White, is *Wha tapoa roo.*

86.—The Spotted Couscous

(*Cuscus maculatus. Cuscus Amboinensis*, Lacép.; *Phalangista maculata*, Geoffr.). This species is a native of the Islands of Amboina and New Guinea, where it is called Couscous or Coëscoës. M. Lesson found it at Waigiou, where it is called Scham-scham. It is arboreal, and its flesh is in request, being esteemed as delicate food by the natives. In colouring this animal is subject to much variation; generally the ground-tint is whitish, ornamented with isolated brown spots; these sometimes blend or run into each other. The fur is thick and woolly.

87.—The Squirrel Petaurus

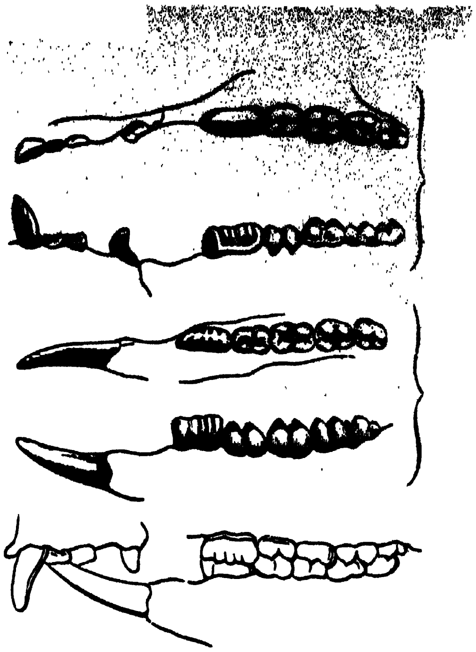
(*Petaurus sciureus*). This creature belongs to a group of beautiful animals, bearing the same relationship to the phalangers that the flying squirrels do to the ordinary squirrels. They constitute the genus Petaurus, subdivided into three minor sections, according to certain modifications of dentition. In the section termed Belideus to which the Squirrel Petaurus belongs the dental formula stands thus (see fig. 88):

Dental formula:—Incisors, $\frac{6}{2}$; canines, $\frac{1-1}{0-0}$. false molars, $\frac{3-3}{4-4}$; true molars, $\frac{4-4}{4-4} = 40$

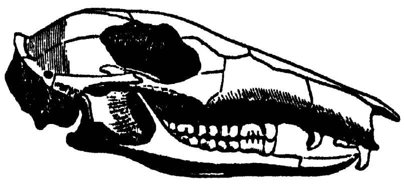
In the figure of the teeth, from F. Cuvier, the number of lower molar teeth (false and true) only amounts to five on each side; in other points also he is erroneous.

The Petauri, or Flying Phalangers, are characterized by a broad expansion of skin on either side of the body between the anterior and posterior limbs; the tail is free, long, and destitute of prehensile power; it forms a balancer to the body in the flying leaps which these animals take, and perhaps assists them in modifying the direction of their career. These animals are nocturnal in their habits, and feed upon fruit, leaves, and insects. During the day they conceal themselves in hollow trees, and are said generally to associate in small flocks. Their aërial evolutions, when the shades of evening have roused them to activity, are described as being peculiarly

83.—Sooty Tapoa.

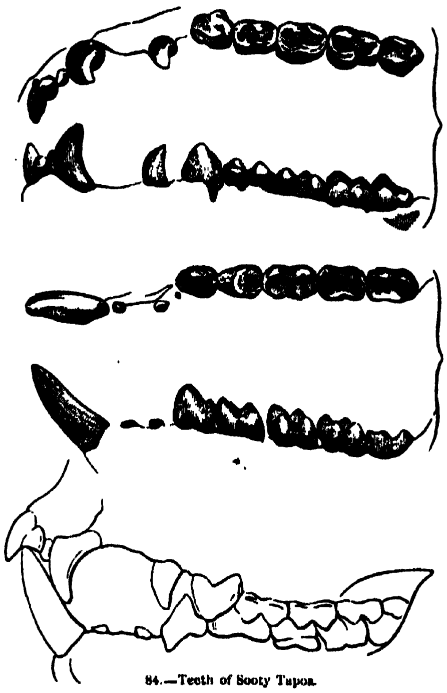


81.—Teeth of Kangaroo Rat.



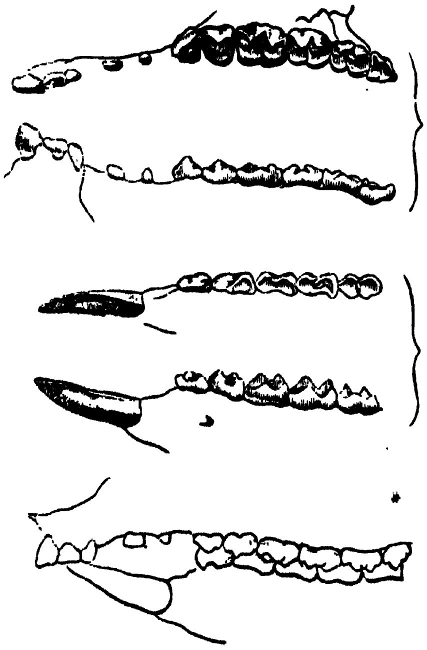
82.—Skull of Kangaroo Rat.

87.—Squirrel Petaurus.



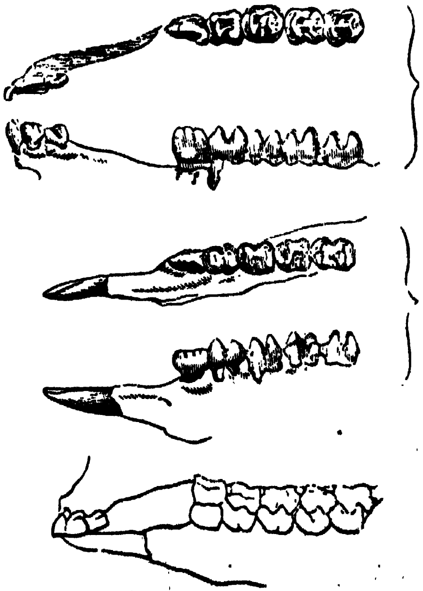
84.—Teeth of Sooty Tapoa.

80 —Kangaroo Rat



88 —Teeth of Squirrel Petaurus

85.—Vulpine Phalanger.

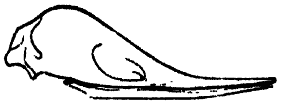


79.—Teeth of Great Kangaroo.

88.—Spotted Couscous.

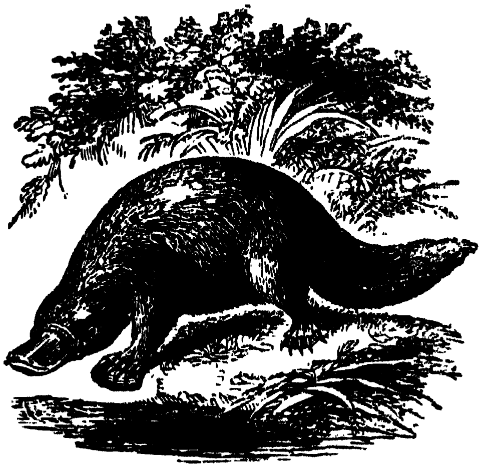
89.—Koala.

92.—Echidna.



93.—Skull of Echidna.

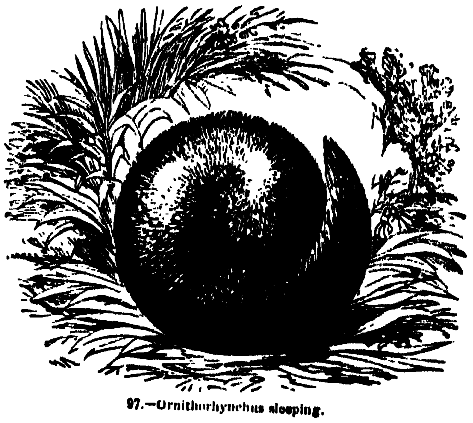
96.—Ornithorhynchus combing itself.



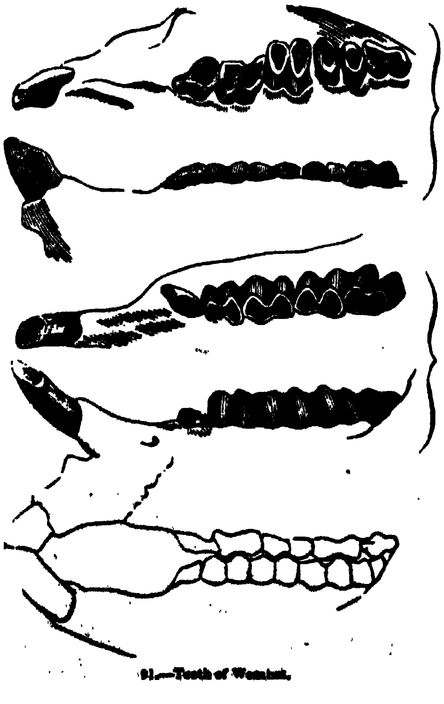
95.—Ornithorhynchus.

90.—Wombat.

101.—Burrow of Ornithorhynchus



97.—Ornithorhynchus sleeping.



91.—Teeth of Wombat.

94.—Ornithorhynchus.

graceful, and their leaps apparently desperate. The Squirrel Petaurus is one of the most beautiful of the genus. It is a native of New South Wales, and is called by the colonists the *Sugar Squirrel* and *Norfolk Island Flying Squirrel.* We have seen two of these animals in captivity: during the day they remained in a state of torpidity, rolled up in a bed of wool and soft hay. At night they became animated, and traversed their cage with great rapidity, leaping from one part to another, and gambolling in the exuberance of a sportive disposition. At the same time they were timid and by no means remarkable for intelligence. While leaping, the lateral membranes are expanded so as to form a parachute. The following anecdote serves to prove both the daring extent of the leaps taken by these animals, and the power they certainly possess of turning or altering their course:—"On board a vessel sailing off the coast of New Holland was a Squirrel Petaurus, which was permitted to roam about the ship. On one occasion it reached the mast-head, and as the sailor who was dispatched to bring it down approached, it made a spring from aloft to avoid him. At this moment the ship gave a heavy lurch, which, if the original direction of the little creature's course had been continued, must have plunged it into the sea. All who witnessed the scene were in pain for its safety; but it suddenly appeared to check itself, and so to modify its career, that it alighted safely on the deck."

The Squirrel Petaurus is about 8 inches long in the head and body, and as much in the tail. The fur is peculiarly delicate and soft; the general colour above is fine grey, somewhat darker on the head, and white beneath. A black line passes from the point of the nose along the back towards the full furred tail; and the lateral folds of skin are bounded in front, and on the sides by a similar band, which confounds itself gradually with the grey of the body: the outer margins of these expansions are fringed with white. The thumbs of the hind feet are strong, distinctly opposable to the sole, and destitute of a claw. The eyes are full and large.

89.—The Koala,

Phascolarctos cinereus (*Lipurus cinereus*, Goldf.; *Phasc. fuscus*, Desmar.; *Phasc. Flindersii*, Less.; The Ashy Koala).

The Koala, or Ashy Koala, is the only species of the genus which has been discovered.

This extraordinary animal is thick and stoutly made, with robust limbs and powerful claws: there is no tail. The head is large, the muzzle blunt, and the naked space in which the nostrils are situated is continued along the nasal bones, till it nearly attains the level of the eyes. The ears are large, standing out from the sides of the head, and tufted with long full fur: the eyes are small. The fore feet have each five toes, armed with large sharp claws: these toes are divided into two sets; the first two forming a pair by themselves, and antagonizing with the other three. The hind feet have also five toes, viz., a large and powerful thumb destitute of a nail, and well padded beneath, and four strongly clawed toes, of which the two first, as in the phalangers, are united together as far as the last joint. It may be here remarked that in some of the phalangers (as Cook's phalanger, &c.) there is a decided tendency in the first two fingers of the fore paws to remain distinct and separate from the rest. The dentition approaches closely to that of the phalangers.

Dental formula:—incisors, $\frac{6}{2}$; canines, $\frac{1-1}{0-0}$; false molars, $\frac{1-1}{1-1}$; true molars, $\frac{4-4}{4-4} = 30$.

The Koala is a native of New South Wales, but does not appear to be very abundant; at least it is seldom seen in collections of natural objects from that country. In its habits it is nocturnal and arboreal; it climbs with great facility, and in passing along the branches suspends itself like a sloth by its claws, which in adults are very powerful. The female carries her young one, when able to leave the pouch, clinging to her back, and long continues her care of it. The Koala however does not live exclusively on the trees: it visits the ground, and there burrows, and that with facility. In the cold season it is said to make a nest in its underground retreat, and retiring to it there to lie dormant. Its food is entirely vegetable, and consists, in part at least, of the young leaves of the gum-trees (*Eucalyptus*). It laps like a dog when drinking, and uses its fore paws in laying hold of the branches while it feeds. Its voice is a soft barking sound. On the ground its gait resembles that of a bear. Length of head and body, about 26 inches. The fur is compact, woolly, and of an ashy grey, patched with white over the crupper: the inside of the thighs is rusty-grey.

The colonists term this animal native bear or monkey. By the Yas natives it is called *goribun.*

90.—The Wombat

(*Phascolomys Wombat*, Peron and Lesueur; *Didelphis ursina*, Shaw.)

The Wombat is the only known species of the genus to which it belongs. It is found in New South Wales, South Australia, and Van Diemen's Land, as well as in some of the islands in Bass's Straits.

In its general figure this animal is heavy and clumsy: the limbs are short; the muzzle blunt; the eyes very small; the ears short and pointed; the nostrils widely separated; the tail a mere tubercle. The feet are broad; the fore feet have five toes with strong nails for burrowing. The hind feet have also five toes, but the inner is merely a little nailless tubercle. The teeth are formed for grinding roots and other vegetable matters. (Fig. 91.)

Dental formula:—incisors, $\frac{2}{2}$; canines, $\frac{0-0}{0-0}$; molars, $\frac{5-5}{5-5} = 24$. All the teeth are deeply implanted, and hollow at the base.

The fur is moderately long and very coarse, indeed almost bristly; the general tint is grizzled-brown, or grey mottled with dusky black; the feet are black; the under parts of the body dirty white. The tip of the muzzle is naked. Length of head and body, upwards of three feet. The first account is in Lieut.-Col. Collins's work ('Account of the English Colony in New South Wales,' 1802), where there is an excellent description, an error as regards the dentition of the animal excepted. The details were furnished by Mr. Bass, and drawn up from a specimen obtained at Preservation Island, and sent to the Newcastle museum.

As might be conjectured from its clumsy form and heavy squat proportions, the Wombat is slow and indolent. It lives in burrows, which it excavates to a considerable depth, and in which it quietly reposes during the day, being nocturnal in its habits. Its food is exclusively vegetable. Its temper is placid; but its intelligence is at a low ratio. When provoked it utters a hissing sound. Its flesh is said to be excellent.

In captivity the Wombat is perfectly contented; it passes the day in sleep, covered over by straw or other materials; it feeds during the night, and in the morning resumes its tranquil slumber. Mr. G. Bennett, in his 'Wanderings,' notices one of these animals which was kept at Been, in the Tumat country, in a state of domestication. "It would remain in its habitation till dark; it would then come out and seek for the milk-vessels, and should none be uncovered it would contrive to get off the covers, and bathe itself in the milk, drinking at the same time. It would also enter the little vegetable garden attached to the station, in search of lettuces, for which it evinced much partiality. If none could be found, it would gnaw the cabbage-stalks without touching the foliage. Although these animals were numerous in the more distant parts of the colony, they are difficult to procure, from the great depth to which they burrow." According to Mr. Bass, though its disposition is gentle, yet it bites and is furious if provoked, and then utters a low cry between a hissing and a whizzing sound. Mr. Bass chased one of these animals, and lifted it off the ground, carrying it for upwards of a mile, without its exhibiting any discomposure, though it was often shifted from arm to arm. When however he proceeded to secure the animal by tying its legs, while he left it in order to cut a specimen of a new wood, it became irritated, whizzed, kicked, and scratched with all its might, and snapped off a piece of Mr. Bass's jacket with its powerful incisors. The creature, whose temper was now ruffled, continued during all the rest of the way to the boat to kick and struggle, and only ceased from exhaustion. According to the natives, the Wombat among the mountains westward of Port Jackson never comes out of its burrow to feed till night, but in the islands it is seen to feed during all parts of the day. The stomachs of such as Mr. Bass examined were distended with coarse wiry grass, but these specimens were living on the islands; and as such grass is not found in the hilly districts of the mainland, he concludes that the animal lives upon the sorts of vegetable that circumstances present to it. He observed this animal on some occasions among the dry ricks of seaweed thrown up upon the shores, but could never discover what it was in search of. Its pace is a sort of hobble, something like the awkward gait of a bear. There is little doubt but that the Wombat might easily be naturalized in our island and other parts of Europe.

92. The Echidna, or Porcupine Anteater

(*Echidna Histrix. Myrmecophaga aculeata*, Shaw; the *Hedgehog* of the colonists at Sydney). The Echidna constitutes the only known example of the genus which it represents. It is characterised by the utter want of teeth. The body is stout; the limbs are extremely short and thick; the fore-paws are compact, and the toes undivided to the claws; these are five in number, large, flat, and blunt; the inner claw is the smallest. The hind-feet are directed obliquely backwards, and are furnished with five claws, of which the first is short, and rises like a thumb at the junction of the foot to the limb. The hind limbs of the male are furnished with a sharp stout spur, situated internally on the tarsus. The head is small, the muzzle elongated into a projecting narrow, beak-like snout, cleft transversely by a very small mouth at the apex. The nostrils are above the mouth, minute and oval. The eyes are small and placed low on the sides of the head; the iris is blue. There are no external ears. The upper surface of the body and also of the short stout tail is covered by a compact mass of thick sharp spines more or less intermingled with coarse hairs. Under ordinary circumstances these spines are directed backwards, converging obliquely to a central line down the back; but they are capable of being elevated, and when attacked the animal rolls itself up like the hedgehog, presenting at all points an array of levelled spears.

The limbs and under surface are covered with brown hairs.

As might be inferred from the strength of its limbs and size of its claws, the Echidna is a burrowing animal. Its food consists of ants and their young, which it takes by means of a wormlike tongue capable of being protruded to a great distance. It appears to be nocturnal in its habits. Mr. G. Bennett states that the native names of the Echidna are 'Nickobejan' and 'Jannocumbine.' It is found in New South Wales, the islands of Bass's Straits, and in Van Diemen's Land. According to the writer last quoted, it inhabits the mountain ranges of Australia, and produces its young in December. It burrows with great celerity, and will even work its way under a pretty strong pavement or base of a wall, removing the stones with its claws. "During these exertions its body is stretched or lengthened to an uncommon degree, and appears very different from the short plump aspect which it bears in its undisturbed state."

The Echidna is eaten by the natives, and is said to taste much like young sucking-pig.

In the 'Proceed. Zool. Soc. Lond.' for 1834, p. 23, will be found the substance of a note from Lieutenant Breton, respecting an Echidna which lived with him for some time in New Holland, and survived part of the voyage to England. The animal was captured by him on the Blue Mountains, and is now very uncommon in the colony of New South Wales. He regards it as being, for its size, the strongest quadruped in existence. It burrows readily, but he knows not to what depth. Previous to embarkation it was fed on ant-eggs and milk, and when on board its diet was egg chopped small, with liver and meat. Its mode of eating was very curious, the tongue being used at some times like that of the chameleon, and at others in the manner in which a mower uses his scythe, the tongue being laterally curled, and the food, as it were, swept into the mouth: there seemed to be an adhesive substance on the tongue by means of which the food was secured. This individual died suddenly, but Lieutenant Breton agrees with MM. Quoy and Gaimard in the opinion that with a little care and attention the animal might be brought alive to Europe.

The skull of the Echidna (see fig. 93) is remarkable for the convexity of the cranial portion and the extreme prolongation and tenuity of the maxillary bones. The orbit is bounded by an oval rim, the lower portion of which consists of the zygomatic arch. The lower jaw is extremely slender. The structure of the sternal apparatus is the same as in the Ornithorhynchus (see fig. 102).

94, 95, 96, 97. The Ornithorhynchus, or Water-Mole of the Colonists

(*Ornithorhynchus Paradoxus*, Blumenb.; *Platypus anatinus*, Shaw; *Mallangong* and *Tambreet* of the natives of the borders of the Yas river, Murrumbidgee, &c.). The genus Ornithorhynchus is perhaps the most singular of any contained in the class Mammalia, and certainly one of the most interesting, especially to the physiologist. It contains those remarkable creatures (perhaps more than one species) furnished with a duck-like beak and webbed feet, which would seem, even from their external organization, to partake in some degree of the nature of a bird—creatures, the first discovery of which excited the most lively astonishment.

On looking at the Ornithorhynchus we are immediately struck with the configuration of the head. Instead of a muzzle gradually continued as we see in other Mammalia generally, it abruptly assumes the appearance of the bill of a duck, being broad, flat, rounded, and covered with a leathery membrane. The outer surface of the upper mandible is greyish black; the palate flesh-coloured; the under mandible paler externally. The edges of both are soft, and the lower, which is the shortest and narrowest of the two, has its edge adapted to a depression under the margin of the upper mandible, which is also channelled with obliquely transverse furrows, those however are merely in the leathery skin. There are no horny laminæ as in the bill of the duck. True teeth are wanting; but on each side in either mandible there are two horny appendages without roots; one on each side is large and tuberculous, situated on the base of the mandibles, at the posterior part of the mouth; the other forms a long narrow ridge on the anterior part of the mandible along the edge (see fig. 98). Capacious cheek-pouches are carried under the skin of the face, from the inside of the mouth, serving as receptacles for food. At the base of the beak, separating between it and the head, there projects a broad loose leathery flap from each mandible, the use of which is probably to defend the eyes and fur of the head from the mud in which the animal grubs, duck-like, in quest of insects. The tongue is short and thick, and covered with long papillæ. The nostrils are two small orifices situated near the apex of the upper mandible. The eyes are small, but brilliant, and placed rather high in the head. The ears open externally by a simple orifice near the external angle of the eyes, and are capable of being expanded or closed at pleasure.

The fore feet are largely webbed and divided into five toes, terminating in strong blunt burrowing claws. The web which unites the toes is tough and leathery: it extends considerably beyond the claws, and would appear at first sight to act as an impediment to the animal while excavating its long burrow. We do not find, however, that this is the case: it can be folded back at pleasure. The hind feet are smaller and less powerful than the anterior pair: they are divided into five toes armed with sharp claws and webbed, but the membrane is not carried out beyond the roots of the claws. The hind feet are directed backwards as in those of the seal (see skeleton, fig. 99), and their action is backwards and outwards. The tarsus of the male is armed with a large sharp moveable spur turned backwards and inwards. It is not used as a weapon of defence, nor are accidental wounds and scratches made by it while struggling in a person's hands attended with ill effects. Formerly this spur was regarded as poisonous. In the female a rudimentary spur may be distinguished (see fig. 100).

The body is elongated, low, and depressed; the fur is close and fine, and consists of two sorts, an under-layer of soft, short, waterproof wadding, and an outer vest of long fine glossy hair, thickly set, and in many instances assuming a crisped appearance. The tail is strong, broad, flattened, and of moderate length: it is covered above with longer and coarser hairs than those of the body, but its under surface is only scantily furnished. General colour deep brown; head and under parts paler; a whitish spot in front of each eye; average length of head and body, including tail, twenty to twenty-three inches; beak, about two inches and a half; tail, four or five inches.

Essentially aquatic, as is sufficiently declared by its outward structure, the Ornithorhynchus passes the active part of its existence almost exclusively in the water. The favourite places of resort of this animal are tranquil parts of rivers with high steep banks, and abounding in waterweeds, among which, and in the oozy mud, are the insects, &c. on which it feeds.

Their burrows (see fig. 101) are excavated in the steep banks overhanging the tranquil sheets of water in which they seek their food. These burrows are continued in a serpentine form, rising as they proceed, the termination often being at the distance of fifty feet from the mouth. The entrance is generally larger than the rest of the passage, but the termination is again enlarged, so as to be commodious for the parents and their offspring. The female produces from two to four at a birth, and in the month of November (a summer month in Australia). The young at an early period (immediately after birth, and for some time afterwards) are naked and very small, and their general aspect is very unlike that of the fully developed animal. They are curled round, the head and tail being doubled on the abdomen; the skin of the body is thrown into transverse folds; the eyes are merely indicated by the convergence of a few wrinkles on the skin, which passes over these organs, proving that their development does not take place till a considerable time after birth, and, together with the helpless rudimentary condition of the young animal, demonstrating that it is necessarily confined for a long period to the nest in which it is brought forth, and consequently that it does not and cannot follow, as has been conjectured, like a duckling just hatched, its parents to the water. The beak is small, soft, and covered with thin skin. "The margins of the upper mandible are rounded, smooth, thick, and fleshy; the whole of the under mandible is flexible, and bends down upon the neck when the mouth is attempted to be opened. The tongue, which in the adult is lodged far back in the mouth, advances in the young animal close to the end of the lower mandible; all the increase of the jaws beyond the tip of the tongue, which in the adult gives rise to a form of the mouth so ill calculated for suction or application to a flattened surface, is peculiar to that period, and consequently forms no argument against the fitness of the animal to receive the mammary secretion at an earlier stage of existence." (Prof. Owen.)

That the Ornithorhynchus suckles its young, and possesses a milk-secreting apparatus, are facts which, though once denied, are now incontestably proved.

If the hairs be removed from the abdomen of a female Ornithorhynchus, an areola or oval spot may be distinguished, consisting of a group of ducts, very minute, yet with orifices larger than those in which the hairs are implanted. The areola varies in extent, and the ducts lead to a large gland beneath the skin, and a thin muscular expansion. This mammary gland is composed of a number of lobes, amounting from one hundred and twenty to two hundred, and these are the cells in which the milk is secreted, and which oozes from the ducts, and is received by the soft mouth of the young, which is capable of being closely applied to the areola.

Specimens of two young Ornithorynchi of different sizes were minutely examined by Professor Owen. The smallest of these rather exceeded two inches in length; the largest was double that size, and was one of the two young ones taken with a mother from a nest, on the banks of the Fish river, by Lieutenant the Honourable Lauderdale Maule, and kept alive for about a fortnight by that gentleman. The stomach of this larger specimen was found to be full of coagulated milk. On carefully inspecting the whole contents with a lens, no portion of worms or bread could be detected, which, Mr. Owen observes, solves the doubt entertained by Lieutenant Maule, as to whether the mother nourished this young one with the food which was given to her for her support, or with the secretion afterwards discovered to escape from the mammary pores; for the mother having been killed by accident on the fourteenth day after her captivity, it was observed, on skinning her while yet warm, that milk oozed through the fur on the stomach. That it was really milk on the stomach of the young animal, Professor Owen demonstrated, and the matter may be considered as fairly set at rest. Another point which seems to be now established is that the Ornithorynchus is ovoviviparous, or, in other words, produces eggs, which, as in the case of the viper, and the viviparous lizard (Zootoca vivipara, Bell), are hatched just before exclusion, the young being born rudimentary and naked.

Referring to our illustrations, fig. 103 exhibits a portion of the integument from the abdomen of the Ornithorhynchus, with the hairs removed, to show the mammary areola. (Owen, 'Phil. Trans.') Fig. 104, a magnified view of the mammary areola, showing the orifices of the ducts of the glandular lobules. Fig. 105 shows the mammary lobular gland of the Ornithorhynchus, reduced below the natural size. (Owen, 'Phil. Trans.') Fig. 106, view of the larger of the specimens of young Ornithorhynchi alluded to. *a*, the nostrils; *c*, the eyes; *d*, the ears; *e*, the vent; *f*, the orifice and rudimentary spur of the hind foot; *g*, membrane at the base of the mandibles. (Owen, 'Zool. Trans.') Fig. 107, smaller specimen of young ornithorhynchus, and front view of head. *a*, nostrils; *b*, prominence on upper mandibles; *e*, vent; *f*, orifice and rudimentary spur on hind foot; *c*, the eyes; *d*, the ears; *g*, the membrane at the base of the mandibles; *h*, the tongue. (Owen, 'Zool. Trans.')

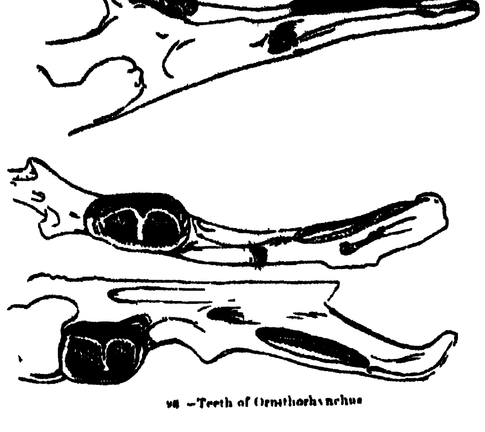
The ratio in which the development of the young Ornithorhynchus proceeds is not ascertained.

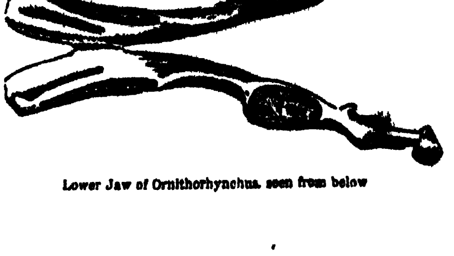
The Ornithorhynchus has never been brought alive to Europe. From the account of Mr. Bennett, who procured and kept several in Australia, it appears to be a lively interesting creature. Its voice, which it utters when alarmed or disturbed, resembles the growl of a puppy, but in a softer key. It dresses its fur. and seems to delight in keeping it smooth and clean. (Fig. 96.) The mandibles are endowed with great sensibility. Speaking of a family of these creatures which he obtained, and which lived a considerable time in captivity, Mr. Bennett says, "The young sleep in various postures; sometimes in an extended position, and often rolled up, like a hedgehog, in the form of a ball. (Fig. 97.) They formed an interesting group, lying in various attitudes in the box in which I had placed them, and seeming happy and content. Thus, for instance, one lies curled up like a dog, keeping its back warm with the flattened tail, which is brought over it, while the other lies stretched on its back, the head resting, by way of a pillow, on the body of the old one, which lies on its side, with the back resting against the box; the delicate beak, and smooth clean fur of the young, contrasting with the rougher and dirtier appearance of the older one: all fast asleep." The gambols of the young Ornithorhynchi are thus detailed: "One evening both the animals came out about dusk, and went as usual, and ate food from the saucer, and then commenced playing with one another like two puppies, attacking with their mandibles, and raising their fore-paws against each other. In the struggle one would get thrust down, and at the moment when the spectator would expect it to rise again and renew the combat, it would commence scratching itself, its antagonist looking on, and waiting for the sport to be renewed. When running they are exceedingly animated; their little eyes glisten, and the orifices of their ears contract and dilate with rapidity: if taken into the hands at this time for examination, they struggle violently to escape; and their loose integuments make it difficult to retain them. Their eyes being placed so high on the head, they do not see objects well in a straight line, and consequently run against everything in the room during their perambulations, spreading confusion among all the light and readily-overturnable articles. I have occasionally seen them elevate the head, as if to regard objects above or around them. Sometimes I have been able to enter into play with them by scratching and tickling them with my finger: they seemed to enjoy it exceedingly, opening their mandibles, and biting playfully at the finger, and moving about like puppies indulged with similar treatment. As well as combing their fur to clean it when wet, I have also seen them peck at it with their beak (if the term may be allowed) as a *duck* would clean its feathers. When I placed them in a pan of deep water, they were eager to get out after being there for only a short time; but when the water was shallow, with a turf of grass in one corner, they enjoyed it exceedingly. They would sport together, attacking one another with their mandibles, and roll over in the water in the midst of their gambols, and would afterwards retire, when tired, to the turf, where they would lie combing themselves. They appeared to be in a great measure nocturnal, preferring the twilight to the bright glare of day."

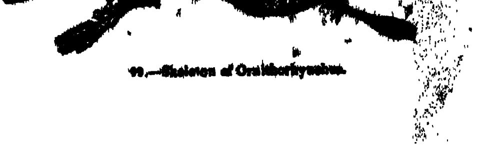
In fig. 108, the skull of the Ornithorhynchus is represented in different aspects: *a*, as seen from above; *b*, as seen from below; *c*, as seen from behind. The upper figure is that of the under jaw. The skull is remarkable for the flattened and elongated form of the bones of the facial portion; the intermaxillary bones, which are, as it were, let into projecting maxillaries, diverge, leaving a vast opening (the foramen incisivum). The cranial cavity is considerable; the orbits are small; the zygomatic arch slender and compressed. The suborbitar foramen appears on the edge of the upper mandible, its situation being marked by a projection of the bone. The lower-jaw is slender and depressed; there are no coronoid processes; the outer sides of the ascending rami (though very narrow) have, as in most, if, indeed, not all the Marsupials, a pit-like cavity for the lodgment of the masseter muscle. The extent of the temporal muscle is trifling. The skull of the Ornithorhynchus can be confounded with that of no other animal.

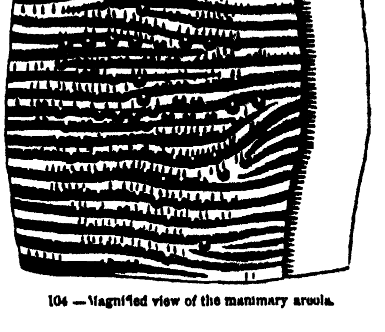
With respect to the sternal apparatus to which we alluded in our account of the Echidna, it appears to be formed more after the model of that of the Saurian reptiles, than after that of Mammalia. (See fig. 102.)

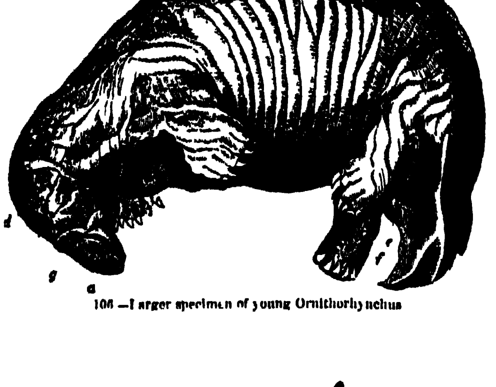
Fossil Marsupials.—Besides the fossil opossum of the Montmartre gypsum (*Didelphys Cuvieri*), and the fossil Dasyurus, Hypsiprymnus, Halmaturus, Phascolomys, and Kangaroo, from the Australian bone-caves and breccia, two fossil forms discovered in the Stonesfield oolite, as evidenced by portions of the lower jaw, have recently attracted much attention and no little discussion. Some anatomists, with M. de Blainville, contend against the Mammal origin of these relics, or at least of one of the forms; but those who have examined the fossils and read the arguments on either side, will, we think, agree with Baron Cuvier and Professor Owen, and assign them to animals of the Marsupial section, which at some epoch tenanted our quarter of the globe. The jaws of these extinct Marsupials, named respectively Thylacotherium Prevostii, Owen (fig. 109), and Phascolotherium Bucklandii, Owen (fig. 110), are represented of the natural size, and also magnified, in order to show clearly the characters and arrangement of the teeth. Those who wish to enter into the full details respecting these fossil relics will do well to consult the 'Geological Proceedings,' 1838-9; Cuvier's 'Ossemens Foss.,' vol. v.; 'Ann. des Sciences,' 1825; and the papers of Mr. Broderip and Dr. Fitton in the 'Zool. Journal,' 1828.


98.—Teeth of Ornithorhynchus

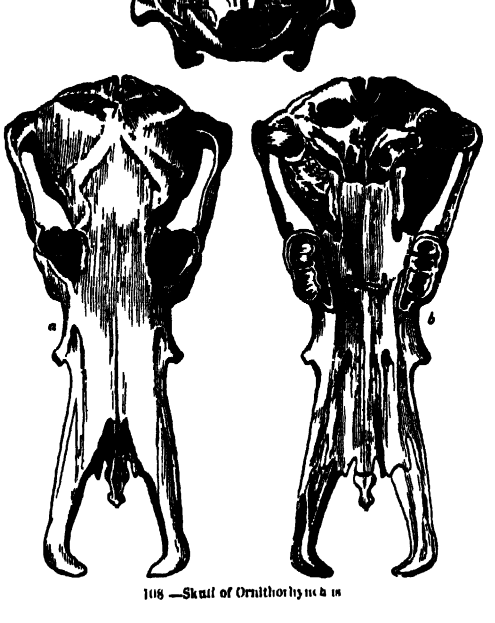

Lower Jaw of Ornithorhynchus, seen from below


99.—Skeleton of Ornithorhynchus.

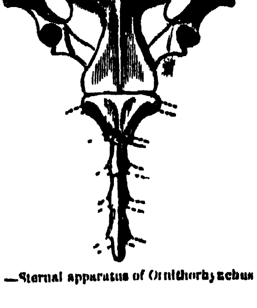

104.—Magnified view of the mammary areola.



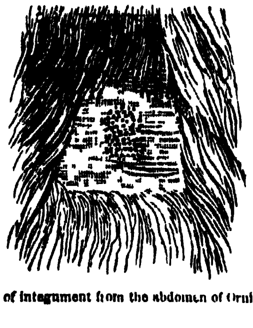
106.—Larger specimen of young Ornithorhynchus

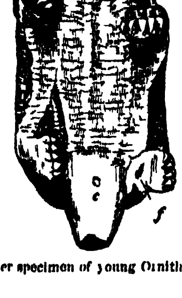


108.—Skull of Ornithorhynchus

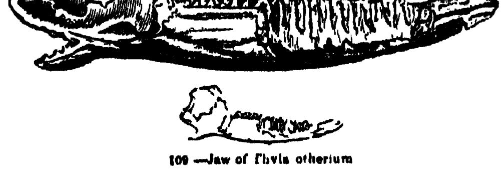

102.—Sternal apparatus of Ornithorhynchus

100.—Magnified hind foot of Female Ornithorhynchus

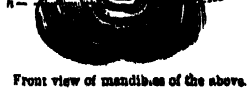

103. Portion of integument from the abdomen of Ornithorhynchus.



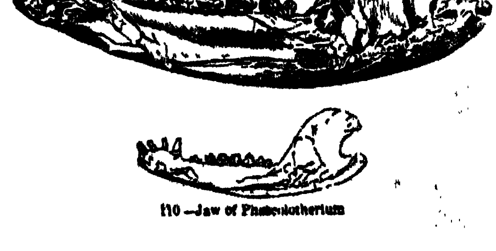
107.—Smaller specimen of young Ornithorhynchus


109.—Jaw of Thylacotherium

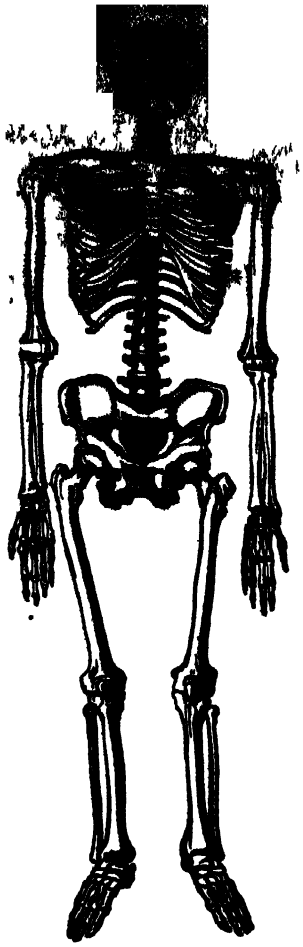
105.—Mammary gland of Ornithorhynchus, reduced below the natural size.



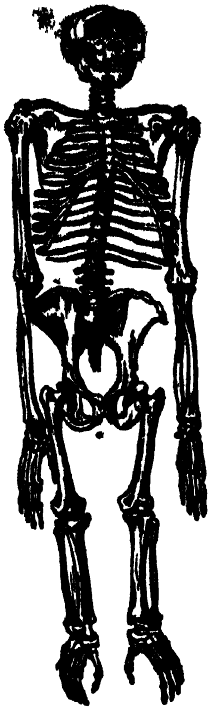
Front view of mandibles of the above.


110.—Jaw of Phascolotherium

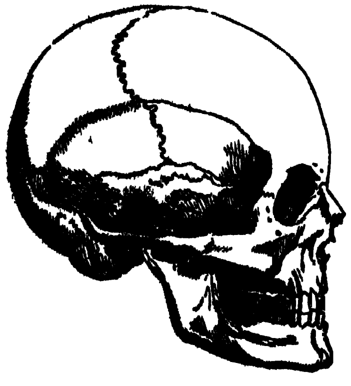
110.—Chimpanzee.



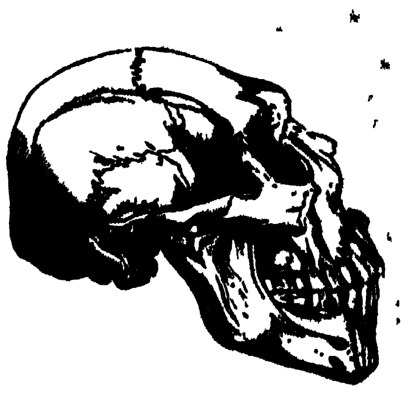
111.—Skeleton of Man



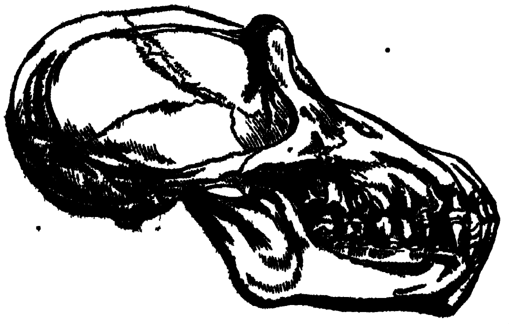
112.—Skeleton of Chimpanzee



114.—Human Skull.

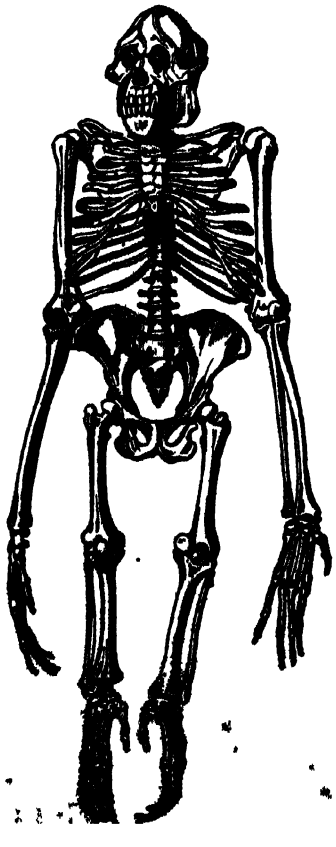


115.—Skull of Human Idiot



116.—Skull of Chimpanzee.

rm for ring the
heir disco this par
ch were that the
they



QUADRUMANA.

APES, MONKEYS, LEMURS.

As the head of the Quadrumanous order is a group consisting of the Chimpanzee, the Orang, and the Gibbons, constituting three genera; and it is among the members of these genera that the nearest anatomical approach to the human subject exists; we say the nearest, for, after all, important and multitudinous are the points of difference Figures 111, 112, and 113, represent the skeleton of man, of the chimpanzee, and of the orang. A glance at them will show the degree of their mutual resemblance, and the distance that intervenes between the osseous structure of the two latter and that of the human form. We shall not attempt to enter into minutiæ, but some of the more important distinctions may be briefly touched upon. In both the chimpanzee and the orang we see the arms far longer than in man: in the former the hands, the skeleton being erect, reach the knee; in the latter they nearly reach the ankle-joint. The proportionate shortness of the lower limbs in these animals is very striking. In the chimpanzee, which is more fitted for the ground than the orang, the feet, or rather hind-paws, are broader and shorter in comparison, and the thigh bone is secured in the socket by means of a straight ligament (the ligamentum teres), which is wanting in the orang; and besides the orang, in a few quadrupeds only. The difference in the form of the chest is evident: in the orang, as in man, the ribs are twelve on each side; but in the chimpanzee they are thirteen, the number, consequently, of the dorsal vertebræ. In the orang the backward position of the occipital condyles (on which the skull rests on the spinal column), and the weight of the face, which is thus thrown forward, require a commensurate development of the spinous processes of the cervical (neck) vertebræ; added to which, the general anterior inclination of the vertebræ themselves renders the length and robustness of these processes the more imperative. In the chimpanzee the spinous processes, though necessarily developed, are so in a less degree than in the orang, the anterior inclination of the cervical vertebræ being less decided, and the weight of the face less oppressive. In both animals (and, indeed, in all the ape tribe) the cervical region is shorter than in man, and therefore better fitted for sustaining the weight of the head, which preponderates anteriorly. In the front view of the orang, the neck cannot be seen. The length of the forehead, and the proportionate shortness of the thumb, are marked characters. The difference in the form of the pelvis between these animals and man is obvious. The narrowness of the os sacrum, and the deficiency in expansion of the iliac bones, are not to be overlooked. With the expansion of the pelvis is connected the development of the lower limbs in man, to whom alone, of all animals, the erect attitude is easy and natural. The magnitude and position of the skull, the structure of the spinal column, the osseous and muscular development of the pelvis and lower limbs, necessitate such an attitude. One advantage gained by this arrangement is the perfect freedom of the superior extremities, the lower limbs being the sole organs of progression. In the orang and chimpanzee all four extremities are organs of locomotion: the chimpanzee, it is true, can proceed on the ground, supported, or rather balanced, on the lower extremities, calling the superior only occasionally into use, except in as far as they are needed to maintain the equilibrium of the body; but man walks with a free step, with his arms at liberty, and with a precision very remote from the vacillating hobble of the tottering chimpanzee.

Figures 114, 115, 116, and 117 are respectively representations, first, of a well-developed human skull; secondly, of the skull of a human idiot; thirdly, of the chimpanzee (female); fourthly, of the orang. The contrast between the first and the two last is very striking; but that even of the idiot possesses those characters which at once proclaim it as belonging to the human species. Professor Owen has well observed, that though "in the human subject the *cranium* varies in its relative proportions to the face in different tribes, according to the degree of civilisation and cerebral development which they attain, and that though in the more debased Æthiopian varieties and Papuans the skull makes some approximation to the Quadrumanous proportions, still in these cases, as well as when the cranium is distorted by artificial means or by congenital malformation, it is always accompanied by a form of the jaws, and by the disposition and proportions of the teeth, which afford unfailing and impassable generic distinctions between man and the ape. To place this proposition in the most unexceptionable light, I have selected the cranium of a human idiot (115), in whom nature may be said to have performed for us the experiment of arresting [illegible] development of the br[illegible] size which it attains in the chimpanzee, and where the intellectual faculties were [illegible] developed; yet no anatomist would hesitate in at once referring this cranium to the human species. A detailed comparison with the cranium of the chimpanzee or orang shows that all those characters are retained in the idiot's skull which constitute the differential features of the human structure." We refer those who wish to investigate the anatomy of the orang and chimpanzee to Professor Owen's papers in the 'Trans. Zool. Soc.' and the 'Proceedings of the Zool. Soc.'

With regard to the external characters of the chimpanzee, the orang, and the gibbons, it may be remarked that they agree in the total absence of a tail, and cheek-pouches, and in the extraordinary length of the anterior extremities compared with the posterior. In some few points the orangs and gibbons agree with each other the nearest, namely, in the presence of extensive laryngeal sacculi, in the extreme length of the anterior extremities, and in the narrowness of the hands and feet, but not in general anatomical structure, aspect, or clothing. A small round head, a compressed face, a narrow under jaw, deep woolly fur, and ischiatic callosities, distinguish the gibbons, both from the orang and the chimpanzee. On the other hand, the orang and chimpanzee are less immediately related than Cuvier seems to have considered them. In most respects the chimpanzee approaches more nearly the type of the human structure, and particularly in the presence of a pendulous uvula at the back of the palate, which is wanting in the orang, and in the structure of the larynx, in which the laryngeal sacs are not developed, as in the orang, but are produced into a cavity of the os hyoides. Still, however, the chimpanzee and the orang are more closely related to each other than the gibbons are to the latter. They are, moreover, the representatives of each other in their respective portions of the globe; the one tenanting the secluded depths of the forests in Western Africa, the other the recesses of the still denser forests of Borneo and Sumatra.

118, 119, 120, 121. THE CHIMPANZEE

(*Pongo* and *Engeco*, Battel, in Purchas's 'Pilgrims;' *Barys*, *Baris*, and *Quojas Morrou* of Barbot, Dapper, &c.; *Smitten*, Bosman; *Pongo*, Buffon; *Pongo*, or *Great Black Orang*, Shaw; *Jocko*, Audebert; *Chimpanzee*, Scotin's print, 1738; *Troglodytes*, *Homo nocturnus*, Linnæus; *Troglodytes niger*, Desmarest). The characters of the genus Troglodytes may be thus summed up:—muzzle long, and truncated anteriorly; supraorbital ridges prominent; forehead depressed; no cranial ridges; facial angle 35°; external ears large and standing out; tail wanting; arms reaching below the knee-joint; feet wide, the thumb extending to the second joint of the adjoining toe, and always furnished with a nail. Canines large, overpassing each other, their points being lodged respectively in intervals of the opposite teeth; intermaxillary bones anchylosed to the maxillaries during the first dentition; ribs, thirteen pairs; no cheek-pouches; laryngeal sacculi, small.

The Chimpanzee is a native of Western Africa, to the extent of ten or twelve degrees north and as much south of the torrid zone, including Guinea, Benin, Congo, Angola, &c. In some districts it appears to be common, and Bowdich ('Mission from Cape Coast Castle to Ashantee:' Lond., 1819) informs us that at Gaboon, where it is by no means rare, it was known to the natives under the name of Inchego and Ingeno. From the negroes he also learned that the adults generally attain to the height of five feet, the breadth of the shoulders being very great, and their strength enormous. A female adult skeleton which we measured stood only three feet ten inches; but the males most probably are larger. The hand of an adult, preserved in spirits of wine, measured nine inches and a half in length, and three inches and four lines in breadth, across the palm. The chimpanzee, the orang, and even the mandrill, have been strangely confounded together in the works of our older travellers, and even naturalists have regarded the two former as identical. Tulpius adopted the term Quojas Morrou, used by Barbot ('Descr. of Guinea'), and Dapper ('Descr. of Africa') also calls the chimpanzee the Satyr of Angola, but he confounds the orang of the Indian Islands with the chimpanzee, and figures as the latter an orang which was brought from Borneo, and presented to Frederic Henry, Prince of Orange, 1777.

Buffon, who adopted the terms Pongo and Jocko (from pongo, inchego, engeco, or enjocko), in his great work (1766), gives an imperfect sketch of a living young chimpanzee which he saw at Paris in the year 1740, and which was taken in Gaboon. At that time Buffon was not aware of any distinction between the African and the Indian animals; but in the supplement (vol. vii.) the two are, [illegible] [illegible] black, [illegible] 'red-brown or chestnut [illegible], called the Jocko,' as a native of Borneo and the other Indian islands. With regard to the Smitten, Barris, Boggo, &c., and which have been applied by the early travellers apparently to the chimpanzee, there is every reason to believe that they really refer to the mandrill.

Mr. Ogilby was the first to point out that the chimpanzee is, as it would seem, alluded to in a work of great antiquity—the 'Periplus Hannonis.' It appears that a Carthaginian navigator named Hanno (A.C. 500, or about that period), sent on an expedition of discovery, coasted Western Africa, and sailed from Gades to the island of Cerne in twelve days; and thence, following the coast, he arrived, in seventeen days, at a promontory called the West Horn. Thence, skirting a [illegible] shore, he arrived in three days at the South Horn, and found an island inhabited by what were regarded as wild men, called by the interpreters *Gorilloi*, who were covered with long black hair, and who fled for refuge to the mountains, and defended themselves with stones. With some difficulty three females were captured, the males having escaped; but so desperately did they fight, biting and tearing, that it was found necessary to kill them. Their preserved skins were carried by Hanno to Carthage, and hung up in one of the temples as consecrated trophies of his expedition. From this time till the sixteenth century of our era we hear nothing of the chimpanzee; for the western coast of Africa was, as it may be said, re-discovered only in the fifteenth century.

One of the most trustworthy of our earlier travellers, Andrew Battel, a sailor, who was taken prisoner in 1589, and lived many years in Congo (Purchas's 'Pilgrims'), describes two animals, the Pongo and the Engeco, the former as high and stouter than a man, the latter being much less. The Pongo, which is doubtless the chimpanzee, he describes as having sunken eyes, long hair on the sides of the head, a naked face, ears, and hands, and the body slightly covered. The limbs differed from those of man, being destitute of calves, but the animal walked upright. In its disposition it is stated to be grave and melancholy, and even when young far from frolicksome; at the same time it is swift and agile, and is sometimes known to carry away young negroes. He further states that these animals constructed arbours in which they slept. Their diet consisted of fruits, nuts, &c.; and their muscular strength is such that ten men were unable to overcome one. Upon the death of one of their community, the survivors cover the body with leaves and branches of trees.

Bosman, Froger, De la Brosse, and others describe the chimpanzee as living in troops, which resist the attacks of wild beasts, and even drive the elephant from their haunts. They possess matchless strength and courage, and it is very dangerous for single individuals to pass near their places of abode. Bosman states that on one occasion a number of them attacked, overpowered, and were proceeding to poke out the eyes of two slaves, when a party of negroes arrived to their rescue. That they surprise and carry away the negresses into the woods, and there detain them sometimes for years, is asserted by all, and an instance came under the personal notice of De la Brosse. Captain Paine was assured that similar instances happen in Gaboon. De la Brosse says they build huts, and arm themselves with clubs, and that they walk either upon two feet or four, as occasion may require.

Lieutenant Matthews, R.N., who resided at Sierra Leone du[illegible] years 1785-6-7, and whose letters describing [illegible] of Africa appeared in 1788, informs us [illegible] himpanzees," or "japanzees," are social animals; and that "they generally take up their abode near some deserted town or village where the papau-tree grows in abundance, of the fruit of which they are very fond. They build huts nearly in the form in which the natives build their houses, which they cover with leaves; but these are only for the females and young to lie in; the males always lie on the outside. If one of them is shot, the rest immediately pursue the destroyer of their friend, and the only means to escape their vengeance is to part with your gun, which they directly seize upon with all the rage imaginable, tear it to pieces, and give over the pursuit."* The terrestrial habits of the chimpanzee are confirmed by other observers.

Lieutenant Henry K. Sayers, who in [illegible] brought a young Chimpanzee to England, which he had procured in the [illegible] country, the mother having

---

* The [illegible]

[illegible] appended by the [illegible] only for [illegible]. From the observations [illegible] [illegible] their full growth till be- [illegible] years of age, which, if true, [illegible] near the human species, as the boy or girl of West Africa, at thirteen or fourteen years old, is quite as much a man or woman as those of nineteen or twenty in our more northern clime. Their height, when full grown, is said to be between four or five feet; indeed I was credibly informed that a male chimpanzee, which had been shot in the neighbourhood and brought into [illegible] Town, measured four feet five inches in length, and was so heavy as to form a very fair load for two men, who carried him on a pole between them. The natives say that in their wild state their strength is enormous, and that they have seen them snap boughs off the trees with the greatest apparent ease, which the united strength of two men could scarcely bend. The chimpanzee is, without doubt, to be found in all the countries from the banks of the Gambia in the north to the kingdom of Congo in the south, as the natives of all the intermediate parts seem to be perfectly acquainted with them. From my own experience I can state that the low shores of the Bullom country, situated on the northern shores of the river Sierra Leone, are infested by them in numbers quite equal to the commonest species of monkey. I consider these animals to be gregarious, for when visiting the rice farms of the chief Dalla Mohammadoo, on the Bullom shore, their cries plainly indicated the vicinity of a *troop*, as the noise heard could not have been produced by less than eight or ten of them. The *natives* also affirmed that they always travel in strong bodies, armed with sticks, which they use with much dexterity. They are exceedingly watchful, and the first one who discovers the approach of a stranger utters a protracted cry, much resembling that of a human being in the greatest distress. The first time I heard it I was much startled; the animal was apparently not more than thirty paces distant, but had it been but *five* I could not have seen it from the tangled nature of the jungle, and I certainly conceived that such sounds could only have proceeded from a human being who hoped to gain assistance by his cries from some terrible and instant death. The native who was with me laid his hand upon my shoulder, and pointing suspiciously to the bush, said, 'Massa, Baboo live there,' and in a few minutes the wood appeared alive with them, their cries resembling the barking of dogs. My guide informed me that the cry first heard was to inform the troop of my approach, and that they would all immediately leave the trees or any exalted situation that might expose them to view, and seek the bush; he also showed evident fear, and entreated me not to proceed any farther in that direction. The plantations of bananas, papaws, and plantains, which the natives usually intermix with their rice, constituting the favourite food of the chimpanzees, accounts for their being so frequent in the neighbourhood of rice-fields. The difficulty of procuring live specimens of this genus arises principally, I should say, from the superstitions of the natives concerning them, who believe they possess the power of 'witching.'

"There are authors who have, I believe, affirmed that some of the natives on the western coast term these animals in their language 'Pongos;' but I beg leave to differ with them as to 'Pongos' being a *native* term. The Portuguese formerly monopolized the trade of the coast, and had large possessions there, as well as in the East Indies, most of the capes, rivers, &c. bearing the names they gave them to this day. Now 'Pongos' I look upon to be a *Portuguese East Indian* term for a tailless monkey, and in consequence of their discovering a river in Africa the banks of which were inhabited by vast numbers of this species, they called it 'Rio Pongos,' a name which it bears still. This I conceive to be the origin of the term, whilst on the coast I observed that all the natives in the neighbourhood of Sierra Leone, when speaking of this animal, invariably called him 'Baboo,' a corruption, I should suppose, of our term Baboon." ('Proceed. Zool. Soc.,' 1839.)

Within the last few years several young chimpanzees have been brought to this country, but [illegible] have long survived. Their human-like appearance, their intelligence and confiding manners, together with their activity, have attracted great interest and given rise to many narrations. Figs. [illegible] and [illegible] were taken from an individual which lived in the menagerie of the Zoological Society from September, [illegible], to September, 1836. Its docility and gentleness were remarkable; but it is well known that the gentleness which characterises the young of all the ape tribe gives place, as maturity advances, to [illegible] obstinacy and [illegible] [illegible] from what we know of the [illegible], we have reason to conclude that the young [illegible] docile they are, would become savage and distrustful as they grew up [illegible], and [illegible] form no exception to the rule. The following description was taken from the young individual alluded to:—

General figure short and stout; chest broad; shoulders square; abdomen protuberant; forehead retreating behind the supraorbital ridge, the cranium otherwise well developed; nose flat; nostrils divided by a very thin septum; lips extremely mobile, and traversed by vertical wrinkles; ears large, naked, and prominent; eyes lively, deep-set, and chestnut coloured; neck short; arms slender, but muscular, and reaching, when the animal stands erect as possible, just below the knee: all the four hands well developed, with opposable thumbs; the nails human-like; the hair moderately coarse and straight, longest and fullest on the head, down the back, and on the arms, thin on the chest and abdomen; on the fore-arm it is reverted to the elbow; backs of hands naked to the wrist; muzzle sprinkled with short white hairs; skin of the face dusky black; ears and palms tinged with a purplish hue; hair glossy black: total height, two feet. The lower limbs are less decidedly organized for arboreal habits than in the orang; but their tournure is obliquely inwards, the knees being bowed out, but the soles of the feet are capable of being applied fairly to the ground. It runs about with a hobbling gait, but very quickly, generally assisting itself by resting the knuckles of the two first fingers of the hand on the ground, to do which it stoops its shoulders forwards: it can, however, and does walk frequently upright. Its pace is a sort of waddle, and not performed as in man, by a series of steps in which the ankle-joint is brought into play at each successive step, the heel being elevated and the body resting on the toes; on the contrary, the foot is raised at once and set down at once, in a thoroughly plantigrade manner, as in stamping, which indeed is an action it often exhibits, first with one foot, then with the other. It grasps with its feet, which are broad and strong, with astonishing firmness, and has been seen, while resting on a perch, to throw itself completely backwards, and, without using its hands, raise itself again into its previous position, a feat requiring both great power and agility.

In the mutilated skin of an adult we found grey hairs mixed with the black, especially on the lower part of the back, the haunches, and thighs, these parts having a grizzled appearance.

122, 123, 124, 125, 126.—THE ORANG-OUTAN (*Pithecus Satyrus*, Geoffr.). So different are the characters, dependent upon age, which the Orang-outan assumes at different periods of its growth, and so much in many respects do the males differ from the females, that no little confusion has arisen; and the young, which is the Simia Satyrus of Linnæus, has only recently been proved to be identical with the Asiatic Pongo (this word is now restricted to the orang); the latter, as Cuvier suspected, and indeed asserted, and as Professor Owen has proved, being the adult. (See *Trans. Zool. Soc.*, vol. i., 'Osteology of Chimpanzee and Orang.')

The difference which the skull assumes in figure, and the relative proportions of the cranial and facial parts, during the transition from youth to maturity, is indeed extraordinary; and so great is the amount of variation ultimately, that the errors of naturalists who had no opportunities of examining a series of crania, of different ages, up to maturity, may well be pardoned. Fig. 117 is the skull of an adult orang, remarkable for the development of the facial portion, the breadth and strength of the lower jaw, the deep cranial ridges, or crests, the contraction of the forehead, and the flattening of the occiput; the strength of the teeth, and the enormous size of the canines. Totally different is the general form and appearance of the skull of the young.

In Borneo there are two species of orang; one of large size, and dreaded by the natives (*Pithecus Wormbii*, or *Pongo Wormbii*), the other of small size, recently characterized by Professor Owen from a skull. This species (*Pithecus Morio*) has been subsequently verified. It is timid and gentle.

It would appear that a distinct species, of large size, distinct from the great Bornean orang, exists in Sumatra. Some naturalists, it is true, are disposed to regard the Bornean and Sumatran large orangs as identical, and it must be allowed that some difficulty exists which remains to be cleared up. Professor Owen has pointed out certain differences in the contour of their respective skulls, which seem to justify those who contend for a distinction of species. In the adult male Bornean orang (fig. 125) there are huge callosities, or protuberances of callous flesh on the cheek-bones, giving a strange aspect to the countenance, and which are presumed to be absent in the Sumatran [illegible] (*Pithecus Abelii*). They are certainly not depicted in Dr. Abel's [illegible] head of the adult Sumatran orang (fig. 127); still, as figures are often faulty, and the adult male Sumatran animal remains to be examined, the point is undecided. With respect to difference of colour, little stress can be laid upon it: the Sumatran species is said to be of a much lighter colour than the Bornean; but all the Bornean orangs we have examined (and those not a few) have been of a chestnut colour, or bright sandy rufous passing into a chestnut on the back, and scarcely, if at all, darker than the Sumatran adult female in the collection of the Zoological Society.

The Sumatran animal is said to exceed the Bornean in stature. According to Dr. Abel the male orang killed at Ramboon on the north-west coast of Sumatra exceeded seven feet in stature—a singular exaggeration, as is now allowed. In the span of the arms and hands, this animal, he states, measured 8 feet 2 inches; and in the length of the foot, 14 inches. Now in the specimen of a Sumatran female in the collection of the Zoological Society, which could not have stood higher than 3 feet 6 inches, the span of the arms and hands is 7 feet 2 inches, and the length of the foot 10 inches and a half. That the Sumatran orang does not exceed the Bornean may therefore be safely concluded. The largest Bornean male orang, an adult, with large facial callosities, which we ever examined measured 4 feet 6 inches from head to heel; but Temminck, in his monograph of the genus, says, "Our travellers inform us by letters from Bangarmasing, in the island of Borneo, that they have recently procured orangs of 5 feet 3 inches in height, French measure" (5 feet 9 inches English). In both the Bornean and Sumatran specimens the ungueal or nail-bearing phalanx of the hind thumb is sometimes absent, sometimes present, in both sexes; sometimes it is present on one foot, and wanting on the other.

Description of a nearly adult male orang from Borneo, in the Paris Museum:—The head is large, the forehead naked, retiring and flat; large fleshy callosities in the form of somewhat crescentic ridges occupy the malar bones, extending from the temples and giving a singular and even hideous expression to the physiognomy. The eyes are small and set closely together; the nose is depressed; the septum of the nostrils thin, and carried out to blend with the skins of the upper lip; the nostrils are oblique; the lips are thick and fleshy, and the upper one is furnished with scanty moustaches; the chin is furnished with a long and peaked beard. The hair is very long and thick on the back, shoulders, arms, and legs; very scanty on the chest, abdomen, and inside of the thighs; the hair of the fore-arms is reverted to the elbows; the hair of the head is directed forwards from a common centre of radiation on the back of the neck, or rather between the shoulders. The contour of the body is heavy, thick, and ill-shapen; the arms with the hands reach to the heel; the thumbs of the hind feet are nailless; the general colour is deep chestnut. Total height, 3 feet 8 inches. Breadth of face across the callosities, 9 inches.

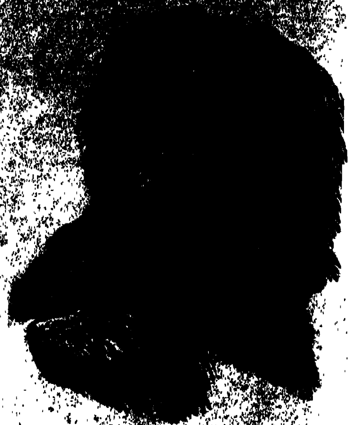
The organization of the orang (we refer to both Bornean and Sumatran animals) fits him almost exclusively for arboreal habits: on the ground his progression is more awkward than that of the Chimpanzee; for the abbreviation of the posterior limbs, their inward tournure, their pliancy, owing to the absence of the ligamentum teres of the hip-joint, and the mode of treading, not upon the sole, but the outer edge of the foot, tend all to his disadvantage. Among the trees, however, the case is reversed. In the mighty forests of his native climate he is free and unembarrassed, though by no means rapid in his movements: there, the vast reach of his sinewy arms enables him to seize branches at an apparently hopeless distance; and by the powerful grasp of his hands or feet he swings himself along. In ascending a tall tree, the inward tournure of the legs and ankle-joints, and the freedom of the hip-joint, facilitate the application of the grasping foot, as is well depicted in figure 124, a sketch taken from a living subject. The length and narrowness of the hands and feet render them hook-like in character: while the short thumbs, set as far back toward the wrist as possible, act as a fulcrum against the pressure of the fingers while grasping the branch to which the animal is clinging.

The difference between the human foot and that of the orang (fig. 128) is very marked; the arrangement of the bones, muscles, and muscular tendons being modified in each for a different purpose. Yet there have been men of learning who have contended that in the course of time, by use, the foot of the orang might assume the form and proportions of the human, and the human that of the orang. Such opinions are beneath criticism.

The physiognomy of the orang is grave, melancholy, and even apathetic, but in adults not unaccompanied by an expression of ferocity; the huge fleshy callosities on the sides of the face adding an

120.—Chimpanzee.

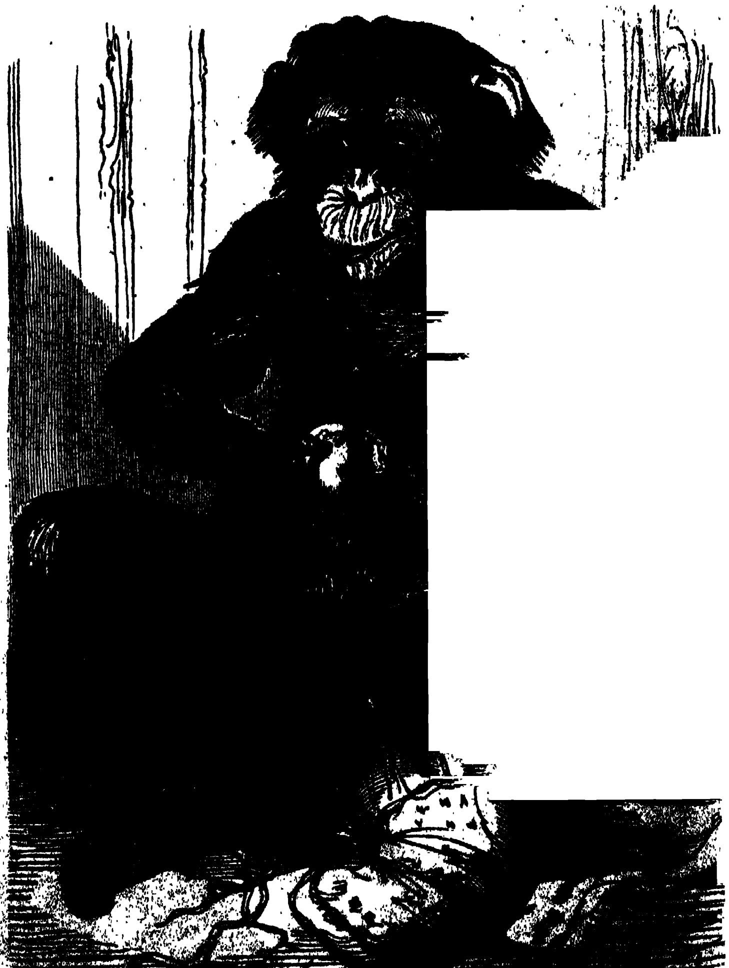
123.—Orang-Outans.



127.—[illegible]

126.—Foot of Man and of Orang-Outang.

[illegible]



5.—Adult Male Bornean

126.— Orang-Outan.

129.—Orang-Outan of the Zoological Society.

131.—Agile Gibbon.

air of brutish grossness. The head leans forward on the chest, the neck is short; and loose folded skin hangs round the throat, except when the laryngal sacs are inflated, this loose skin is then swollen out, like a naked shining tumour, extending up along the sides of the face under the small angular ears, filling up the interspace between the chin and chest, and encroaching upon the latter: the lips are wrinkled, and possess extraordinary mobility; the animal can protrude them in the form of a snout or proboscis, contracting the mouth to a circular orifice, or, on the contrary, draw them back, and turn them in various directions. The breadth of the chest and shoulders conveys an idea of great strength; the abdomen is protuberant; the hair, which falls on the back and shoulders in long masses, forms a covering to the animal crouching in repose, necessary as a protection by day against the burning rays of the sun, by night against the heavy dews, and during the rainy seasons as a shelter from the falling showers. The palms of the hands have lines and papillæ, as on those of the human subject. All the naked parts of the body, with the exception of the orbits and lips, which are of sallow, coppery tint, are silvery-grey or plumbeous. The thickness of the incisor teeth, which in adults are worn down to a flattened surface, as are also the molar teeth, shows that they are put to rough work, and, as Professor Owen remarks, it is probable that their common use is to tear and scrape away the tough fibrous outer covering of the cocoa-nut, and perhaps to gnaw through the denser shell. The huge canines are doubtless defensive weapons, which, in connection with the muscular strength of these animals, enable them to offer a more than successful resistance against the leopard, and render them formidable opponents even to the tiger. Of the habits of the Orang in a state of nature our knowledge is limited. It tenants the secluded recesses of the forests in the hilly and central districts of Borneo and Sumatra; living, as it would appear, a secluded life, and not being, like the Chimpanzee, gregarious; nor does it, like that animal, build huts, but, in accordance with its arboreal predilections, it constructs a rude seat or platform of interwoven boughs and twigs among the branches of the tallest trees, on which it takes up its abode. Here the adult male will sit, as is said, for hours together listless and apathetic. His movements are slow and indolent: when attacked, he swings himself from branch to branch, clearing vast intervals with ease, but not with the rapidity which has been imagined, and which is displayed by some of the Gibbons. If at last driven to extremity, he defends himself with determined resolution, and his prodigious bodily powers and prowess render it dangerous to venture on a close assault. The females are devoted to their young. A few years since, Captain Hall repaired to Sumatra purposely to obtain one of these animals, but at his outset he experienced a serious obstacle in the difficulty of procuring guides to conduct him to their usual haunts: this proceeded from the fears of the natives, who not only believe that the orangs possess a natural dominion over the great forests, but that they are animated by the souls of their own ancestors. Succeeding at length in this preliminary part of the undertaking, the Captain soon met with one of the objects of his search, a female, which he describes as having been five feet in height. When first discovered she was sitting on a branch of one of the highest trees, with a young one in her arms. Upon being wounded she uttered a piercing cry; and immediately lifting up her little one as high as her long arms could reach, let it go among the topmost branches. While the party approached to fire again she made no attempt to escape, but kept a steady watch, glancing her eye occasionally towards her offspring, and at last seemed to wave her hand, to hasten its departure, which it safely effected.

The following summary is the result of our repeated observations upon young living specimens:—The progression of the orang on the ground is slow and vacillating, and is rather dependent on the arms, which from their length act as crutches, supporting the body between them, than upon the lower limbs, which are ill calculated for such service. When left entirely to itself on the floor, the young orang, if incited to walk, supports its weight on its arms, applying the bent knuckles to the ground, which, from the length of the arms, is an easy action. The lower limbs are at the same time bowed outward, and the outer side of the foot is placed upon the floor. In this attitude it waddles along, the arms being the main support; when indeed it wishes to hasten its progress, it fairly swings the body forward between the arms, as if impatient of the hobbling gait to which the structure of the lower limbs restricts it. The lower limbs, however, are not incapable of supporting the body alone, and it can waddle along very fairly, especially if it can lay hold of anything by which to steady itself in its progress. In climbing it is at its ease, and confident, but deliberate. It will suspend itself with its head downwards, sometimes by the hand and foot of the same side, the disengaged hand being stretched to seize objects within its reach; sometimes by the hook-like hands, or the feet alone, varying its grotesque attitudes in the most singular manner, and in all displaying the freedom of the hip-joint. Its arboreal progress is not by bounding like a monkey, but by swinging from branch to branch, grasping them by its hands in succession. Habitually dull and inanimate, it has still its times of sportiveness, and will engage in play with those to whom it has attached itself, following them to court their notice, or pursuing them in mimic combat. It has little curiosity, and is fond of sitting covered up by blankets or other articles of defence against the cold, and will wrap itself up with considerable dexterity. To those who attend it it becomes very affectionate, and readily obeys their voice, recognising its name, and the words and tones of command. Confinement is annoying to it in the extreme, and disappointment irritating. From these causes paroxysms of passion are often exhibited, in which it will dash itself about, uttering a whining cry, and manifest every token of anger. We have seen a young orang make the most strenuous efforts to escape from his inclosure, striving to force the door or the frame-work; and then, screaming with disappointment, swing from branch to branch, and again repeat its endeavours, excited to the extreme, and all because its keeper had left it for a short time. Nothing but his return and attentions would pacify it.

Dr. Abel states that his young orang displayed great alarm at the sight of some live turtles, and also of a tortoise; looking at them with horror from a distant place, to which he had retreated for security, and projecting his long lips in the form of a hog's snout, while at the same time he uttered a sound between the croaking of a frog and the grunting of a pig. The young chimpanzee which lived in the year 1836 in the menagerie of the Zoological Society recoiled with horror from a large snake introduced into the room by way of experiment, and also regarded tortoises with aversion; and a young orang in the same menagerie, before which a tortoise was placed, stood aghast in an attitude of amazement ludicrously theatrical, gazing upon the crawling animal with fixed attention and evident abhorrence. On the other hand we have seen a young orang play with a full-grown cat, drag it about, put the animal on its own head, and carry it from branch to branch, regardless of its scratching and struggles to get free. Fred. Cuvier notices the same fact, which we have ourselves verified. The young orang may be taught to use a spoon, a cup, or glass with tolerable propriety, and will carefully put them down on the table, or hand them to some person accustomed to receive them. To this point F. Cuvier also alludes, as well as to the care it takes in adjusting its bed, and covering itself warmly with blankets and other materials when retiring to rest.

The young chimpanzee, in comparison with the orang, is far more lively, animated, and frolicksome; and displays much more curiosity, being alive to everything which takes place about it, and examining every object within its reach with an air so considerate, as to create a smile in the face of the gravest spectator. In alertness it exceeds the orang, and is to the full as gentle and affectionate, and more intelligent. The expression of intelligence is indeed well denoted by the vivacity of its eyes, which, though small and deeply set, are quick and piercing.

Figure 129 is a portrait of the young orang-outan in the menagerie of the Zoological Society in the warm dress which it habitually wore; but in which it was completely disguised.

THE GIBBONS

(Genus *Hylobates*). The gibbons differ from the thickset orang in the slenderness of their form; the chest is indeed broad and the shoulders muscular, but the waist and hips are contracted; there are small ischiatic tuberosities hidden by the fur, on which the animals often rest, the commencement, so to speak, of a structural peculiarity carried out to its maximum in the lower groups. The hands and feet are admirably formed for clinging with tenacity to the branches. The arms are of excessive length, reaching in the erect attitude to the ankle-joint; the hands are remarkably long and slender, the naked palm is linear, expanding at the base of the fingers, which are covered down the backs with fur; the thumb of the fore-hands, though very short, resembles the fingers in form and direction, and is scarcely or not at all opposable to them; it seems to rise from the wrist, owing to the almost complete separation of the metacarpal bone from that of the first finger; and the ball formed by its adductor muscles is trifling. The feet are long and slender, and their thumb is greatly developed, so as to form an antagonist to the other toes completely. In some species the first and second finger of the foot are more or less united together: this union in the Siamang is carried to the last joint. The lower limbs are short, and bowed in, and the ankle-joint has that inward tournure so advantageous to an arboreal animal; but the hip-joint is secured by the ligamentum teres. In one species, the Siamang, there is a large laryngal sacculus. The skull is well formed, though the forehead retreats. The rami of the lower jaw are narrow. The incisor teeth are moderate, the canines slender; the molars moderate, with the crown broad, and bluntly tuberculate.

Dental formula (fig. 130.) Incisors, $\frac{4}{4}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{5-5}{5-5} = 32$. The gibbons are clothed with deep thick fur, softer in some species than others: on the fore-arms it is in most species reverted to the elbows; in one or two it is erect. The prevailing colours of these animals are from black to brown, brown-grey, and straw-yellow.

The gibbons are distributed through Java, Borneo, Sumatra, Malacca, and Siam, where they tenant the forest branches, among which they display the most astonishing activity. They sweep from branch to branch with arrow-like velocity: their mode is to suspend themselves by their long arms, and by an energetic muscular movement to launch themselves onwards, aiming at a distant branch, which they seize with admirable precision. Most live in troops or families; some species frequenting the mountain-ranges covered by forests of fig-trees, others keeping to the forests of the plains.

The head of the gibbon is small and of an oval figure, and the face is depressed; the expression of the countenance being grave, gentle, and rather melancholy. All utter loud cries, whence, in imitation of the sound, has arisen the name of Wou-wou, which appears to be common to two or three species; Fred. Cuvier has applied it to the Agile Gibbon, but Camper had previously appropriated it to the Silvery Gibbon, said by Dr. S. Müller to be called Oa-oa by the natives of Java, a word differing little in the sound from wou-wou, or woo-woo. None of the gibbons attain to the stature of the orang, about three feet being the height of the largest species standing erect, an attitude which they are capable of assuming on the ground or any level surface, along which they waddle, at a quick pace, in the manner of the chimpanzee, using the arms as balancers, or occasionally touching the ground with the fingers.

131, 132, 133.—THE AGILE GIBBON;

also known under the native titles Ungka-puti and Ungka-etam (*Hylobates agilis*, F. Cuv.; *Hylobates Lar; H. Rafflesii*).

This interesting gibbon is a native of Sumatra, and owing to certain variations in colour, to which it is subject, has been formed into two distinct species, an error now corrected. M. Müller, in reference to this gibbon, states that it is curious to observe its numerous variations. "Two individuals are never precisely the same; and we were therefore disposed to conclude, during the early part of our stay in Sumatra, that there were really different species of what, as it proved, is but one Hylobates: for it was only after the examination of individuals of different colours, and after we had killed many of both sexes and various ages, that we came to the conclusion that the oengko-itam, or black oengko, and the oengko-poetih, or white oengko, of the Malayans, were the same species."

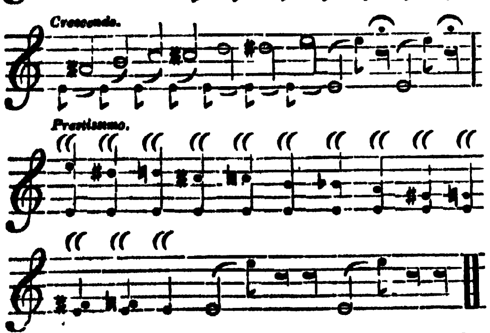
The general colour of this species varies from black to brownish-yellow, and yellowish white; a white or pale stripe traverses the brow; and the sides of the face and throat are often grey or flaxen: in black or dark individuals the lumbar region and crupper are usually of a pale rusty-brown or yellowish; the pale individuals have the throat, chest, and abdomen of a darker brown. The pale-coloured females often produce black young, and the black as often young of a pale colour. (See fig. 132.) We have seen straw-white young. The fur is soft and woolly: the two first fingers of the feet are united together at the base.

The Agile Gibbon usually lives in pairs, and is timid and gentle: its activity and the velocity of its movements are wonderful; it escapes pursuit almost like a bird on the wing. On the slightest alarm it ascends rapidly to the top of a tree; it there seizes a flexible branch, swings itself two or three times to gain the requisite impetus, and then launches itself forward, repeatedly clearing, without effort and without fatigue, as Mr. Duvaucel witnessed, spaces of forty feet.

Some few years since a female of this species was exhibited in London. The activity of this animal in the large compartment in which it exercised itself, and the velocity and precision with which it launched itself from branch to branch, excited the admiration of all who beheld it. Distances of twelve and eighteen feet were thus cleared, the gibbon keeping up a succession of launches, without intermission and for a great length of time, and all the while exhibiting an air of nonchalance, as if the feat was of the most easy performance. In her flight, for so indeed it might be termed, the gibbon seemed but to touch the branches with her hands in her progress, the impetus being acquired during that momentary hold; and it could not be doubted that if the animal had been in the enjoyment of liberty in her own native forest, distances far exceeding eighteen feet would have formed no interruption to her progress. It was curious to witness how she could stop in her most rapid flight when the momentum was at the highest, and it might naturally have been supposed that a gradual cessation would have been required. Suddenly as thought, however, she arrested her progress; the branch aimed at being seized by one hand, a rapid and energetic movement raised the body up; the branch was then grasped by the hind hands, and there she sat, quietly gazing at the astonished spectators of her extraordinary gymnastics. With the same abruptness did she throw herself into action. Admirable was the precision with which she calculated her distances and regulated the impulse necessary to clear intervals varying from four, five, or six, to eighteen feet: such indeed was her quickness of eye, that when apples or other fruits were thrown at her, or so as to pass near her in her flight, she would catch them without apparent effort, and at the same time without discontinuing her career.

While exerting her feats of agility the gibbon ever and anon uttered her loud call-notes, consisting of the syllables oo-ah, oo-ah, in a graduated succession of half-tones, ascending in the scale till an exact octave was attained, when a rapid series of descending notes, producing a shake, during the execution of which the lips vibrated and the whole frame quivered, concluded the strain. The quality of these notes was not unmusical, but their loudness was deafening as heard in the apartment, and when uttered by these animals in their native forests must resound far through their stilly depths. It is principally in the morning that the gibbon exerts the whooping cry, which is doubtless its call to its mate or companions, and it was at that time that we heard it. It should be observed that at first the syllables were slowly and distinctly repeated, and on the same note, E. As the tones rose in the chromatic scale, the time quickened, till, gaining the octave, the descent by half-tones was inexpressibly rapid: this ended, two barks followed, each composed of the high and low E, sounded nearly together. At the conclusion the animal was always violently agitated, as if wrought up to a high pitch of excitement, and shook with all her strength the branch to which she was clinging, or the netting, the cords of which she grasped with her hands.

The following notes will give a correct idea of the musical call of this gibbon:—



This interesting animal was timid and gentle; she greatly preferred the presence of females to that of men, and approached them and received their attentions with pleasure: there is reason to believe that ill-treatment had made her suspicious of the sex from which she had experienced injury. She was intelligent and observant, and her quick eyes seemed to be ever on the watch, scrutinizing every person and observing all that passed around her. When a person had once gained her confidence, she would descend to meet him as often as invited, and allow her hands to be taken hold of, and her soft fur stroked without any hesitation: to females, though strange to her, she gave her confidence, without any previous attempts at conciliation. The muscular power of the arms, shoulders, and chest was very great, and the muscles were finely developed; the chest was broad and the shoulders high; the reach of the extended arms was about six feet, and the animal when erect stood about three feet from the heel to the top of the head. The form and proportions of this gibbon could not fail to strike the most casual observer, as adapting it not only for an arboreal existence, but for that kind of arboreal progression, those flying launches from branch to branch, which have been described.

134, 135.—The Siamang

(*Hylobates syndactylus*). The Siamang is the largest of the Gibbons, being upwards of three feet in height, and at the same time robust and muscular. The fur is woolly and black; the first and second fingers of the feet are united to each other, and there is a huge laryngal pouch on the throat covered with black naked skin, which, when the sac is distended with air, is smooth and glossy. The use of this apparatus is not very apparent; most probably the sac has some influence on the voice; for Mr. G. Bennett ('Wanderings,' &c.) observes that when the siamang in his possession was irritated he inflated the pouch, uttering a hollow barking noise, the lips being at the same time pursed out and the air driven into the sac, while the lower jaw was a little protruded. It is this noise which M. Duvaucel describes, as we suspect, when he states that the siamang rouses occasionally from its lethargy to utter a disagreeable cry approaching in sound to that of a turkeycock, and which he takes upon himself to say expresses no sentiment and declares no wants. Mr. Bennett noticed that the sac was inflated, not only during anger, but also when the animal was pleased. It is exclusively in Sumatra that the siamang is found: it is abundant in the forests, especially in the neighbourhood of Bencoolen, which resound with the loud and discordant cries of the troops sheltered among the lofty branches. Duvaucel says that this species is slow, inanimate, and destitute of activity among the trees, and on the ground it is so overcome by fear as to be incapable of resistance; that in captivity it exhibits no pleasing traits, being at once stupid, sluggish, and awkward, unsusceptible either of feelings of grateful confidence or of revenge, and regarding nothing with interest. On the contrary, Sir T. S. Raffles, who kept several of these animals, describes the siamang as bold and powerful, but easily domesticated, gentle, confident, and social, and unhappy if not in company with those to whom it is attached. Nay, M. Duvaucel contradicts himself: first he says all its senses are dull and imperfect, and then gives an account of its extreme vigilance and acuteness of hearing, and of the affection of the mothers for their young. If a young one be wounded, the mother, who carries it or follows it closely, remains with it, utters the most lamentable cries, and rushes upon the enemy with open mouth; but being unfitted for combat, knows neither how to deal nor shun a blow. It is, he adds, "a curious and interesting spectacle, which a little precaution has sometimes enabled me to witness, to see the females carry their young ones to the water, and there wash their faces, in spite of their childish outcries, bestowing a degree of time and care on their cleanliness, which, in many cases, the children of our own species might envy." The Malays informed him that the young are carried respectively by those of their own sex; and also that the siamang frequently falls a prey to the tiger, under the influence of that sort of fascination which intense terror produces, and which the snake is said to exercise over birds and squirrels.

Mr. G. Bennett's account ('Wanderings,' &c.) of the siamang which he kept for some time gives us a very favourable impression of it disposition and intelligence. The adroitness and rapidity of its movements, the variety of attitudes into which it threw itself, when climbing about the rigging of the vessel in which it was brought from Singapore, and the vigour and prehensile power of its limbs, indicated its adaptation to the branches of the forest. Its disposition was gentle, but animated and lively, and it delighted in playing frolics. With a little Papuan child on board this siamang became very intimate; they might often be seen sitting near the capstan, the animal with his long arm round her neck lovingly eating biscuit together. In his gambols with the child he would roll on deck with her, as if in mock combat, pushing with his feet (in which action he possessed great muscular power), his long arms entwined round her, and pretending to bite. With the monkeys on board he also seemed desirous of establishing amicable companionship, evidently wishing to join them in their gambols; but as they avoided his company, probably from fear, he revenged their unsociableness by teasing them, and pulling their tails at every opportunity. He recognised his name, and would come to those he knew when called, and soon became a general favourite, for his liveliness was not accompanied by the love of mischief. Yet his temper was irritable, and on being disappointed, or confined, he would throw himself into fits of rage, screaming, rolling about, and dashing everything aside within his reach: he would then rise, walk about in a hurried manner, and repeat the scene as before. With the cessation of his fit of anger, he did not abandon his purpose, and often gained his point by stratagem, when he found that violence was of no avail.

When vessels were passed at sea, it was very amusing to see him take his position on the peak haulyards, and there gaze on the departing ship till she was out of sight. After this he would descend, and resume his sports. One instance of his intelligence is peculiarly interesting. Among various articles in Mr. Bennett's cabin, a piece of soap greatly attracted his attention, and for the removal of this soap he had been once or twice scolded. One morning Mr. Bennett was writing, the siamang being present, in the cabin; when casting his eyes towards the animal he observed him taking the soap. "I watched him," says the narrator, "without his perceiving that I did so; he occasionally cast a furtive glance towards the place where I sat. I pretended to write; he, seeing me busily engaged, took up the soap and moved away with it in his paw. When he had walked half the length of the cabin, I spoke quietly, without frightening him. The instant he found I saw him, he walked back again, and deposited the soap nearly in the same place whence he had taken it: thus betraying, both by his first and last actions, a consciousness of having done wrong."

This animal died when nearing our shores, to the regret of all the crew.

136.—The White-handed Gibbon.

(*Hylobates Lar*). To this species we refer both the Grand Gibbon and the Petit Gibbon of Buffon. It is the Simia longimana of Erxleben, and the Simia albimana of Vigors and Horsfield, the Pithecus Lar of Geoffroy, and the Pithecus variegatus of Geoffroy, Kuhl, and Desmarest. The fur is soft and woolly; the colour varies from dirty-brownish, or from yellowish-white, to deep umbre brown or blackish brown, the crupper being paler; the face is encircled by a band of white; the hands and feet are white; the first and second finger are sometimes united at the base.

The White-handed Gibbon is a native of Malacca and Siam; but of its peculiar habits nothing is ascertained. It is one of those species which has hitherto been in a state of confusion; but from which opportunities of examining numbers of specimens have enabled us, as we trust, to disentangle it.

137.—The Silvery Gibbon, or Wouwou of Camper

(*Hylobates leuciscus*). This gibbon is a native of Java, where it was met with by M. Müller, who states that it is called there Oa-oa, from its cry, whence also the name Wou-wou, which has been given to other species. The fur is fine, long, close, and woolly; the general colour is ashy-grey, sometimes slightly tinged with brown, and paler on the lower part of the back; the sides of the face are white; the soles and palms are black. According to Müller, the tint of grey varies in intensity, and sometimes has a brownish, sometimes a yellowish tone, the face being encircled with white or light grey. In aged animals the chest becomes of a blackish colour.

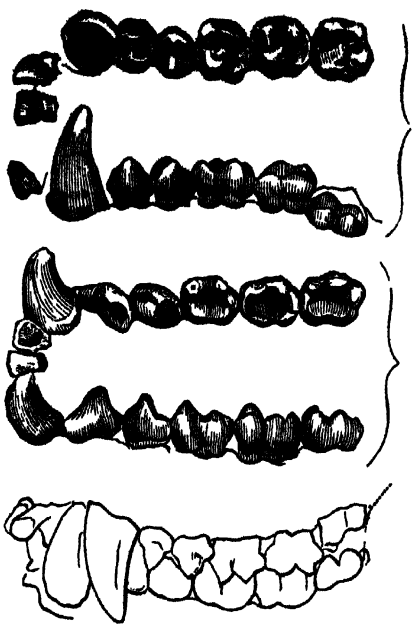
It is to the celebrated anatomist Camper that we owe the recognition of the Silvery Gibbon or Wouwou as a distinct species. The specimen which he dissected was brought from one of the Moluccas: in these islands it is reported to frequent the dense jungles of tall canes, amongst which it displays astonishing activity. Two or three living individuals appear at different times to have existed in England. Of these one belonged to Lord Clive, and is described by Pennant. It was good-tempered, lively, and frolicksome. In 1828, a young male lived for a short time in the menagerie of the Zool. Soc. Lond.

MONKEYS

(Genus *Semnopithecus*). The genus Semnopithecus was established by Fred. Cuvier, and anatomy has confirmed the propriety of this genus, originally established upon external characters.

The Generic Characters are as follow:—muzzle depressed; head round; superciliary ridge prominent, and with a row of long stiff hairs projecting forwards and upwards; molars crowned with obtuse tubercles, the last molar of the lower jaw with a fifth tubercle seated posteriorly; cheek-pouches wanting; laryngal sac large; ischiatic callosities moderate; body slender, limbs long and thin; the thumb of the hand small, short, almost rudimentary; stomach large and highly sacculated; intestines long; tail long and slender, fur soft, flowing, and often glossy.

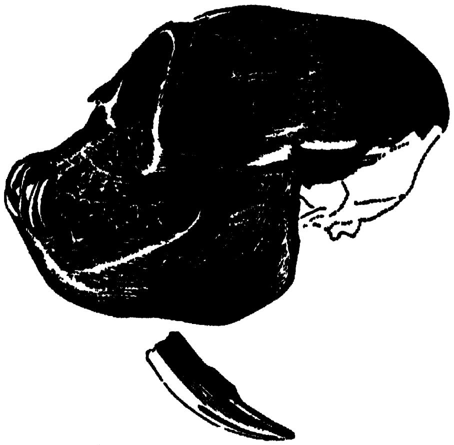
126.—White handed Gibbon.



130 —Teeth of Gibbon

127.—Silvery Gibbon.

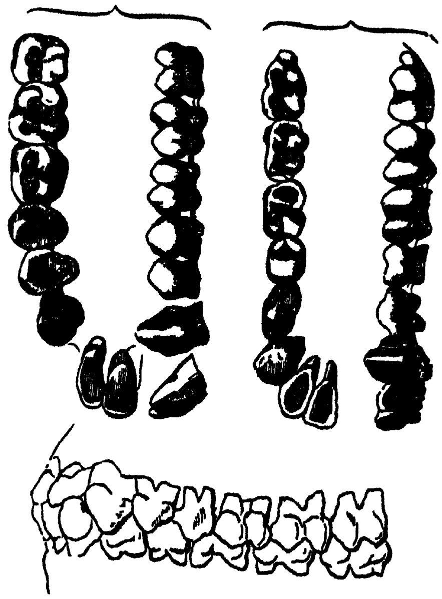
128.—Female Agile Gibbon and Young.



139.—Skull and canine tooth of Monkey

133.—Male Agile Gibbon

125.—Siamang.



131.—Teeth of Monkey.

124 —Siamang.

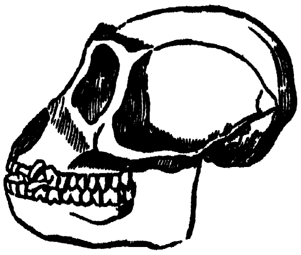
150.—Temminck's Colobus

1.—Face of Adult Kahau.

146.—Entellus.

143.—Face of young Kahau.

—Nose of adult Kahan, seen from beneath.



145.—Skull of Kahau

141.—Kahan.

140.—Kahau.

148.—Budeng and Young

147.—Black-crested Monkey

139.—White-thighed Colobus.

Dental formula (figure 138): incisors, $\frac{4}{4}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{5-5}{5-5}$. The incisors are small; the canines large, broad, and compressed; the molars are bluntly tuberculate; and as they wear down, the surface shows the enamel very distinct and deeply indented. The skull, as exemplified by that of S. Maurus (figure 139), may be characterised as round, the orbits large and squared, with an abruptly prominent superciliary ridge, and with boldly projecting margins; the interorbital space is broad, and the face depressed; the lower jaw, however, is very deep, and the space for the masseter muscle considerable; the chin recedes obliquely. The hands of the Semnopitheci are remarkable for their elongation and narrowness, and for the almost rudimentary condition of the thumb, which cannot be brought into action as an antagonist to the fingers; the feet also are narrow and elongated, but the thumb is stout and well developed.

There are no cheek-pouches, as in the ordinary monkeys, but a large laryngal sac extends over the whole of the throat, communicating with the larynx (windpipe) by means of a large aperture. The stomach is sacculated in an extraordinary manner, the sacculi being in all probability preparatory receptacles for the vegetable aliment, which undergoes digestion in an elongated pyloric portion.

Cuvier calls the Semnopitheci slow monkeys; but it is only in a certain sense that they merit the title. The length and slenderness of the limbs and body detract, if not from their agility, at least in some degree from the abruptness of their movements, which have a more sweeping character than those of the Cercopitheci. Nevertheless, they leap and bound among the branches of their native forests with great ease, and to vast distances, their long tail acting as a director or balancer in their motions. Less lively, less petulant, and, perhaps less inquisitive than the Cercopitheci, they appear at times as if oppressed with melancholy, and in captivity, at least, sit in listless apathy. While young they are very gentle; but when adult they become sullen, morose, and vindictive; and their long canines render them truly formidable. In their native regions they associate in troops. In some parts of India, certain species, as the Entellus, are regarded as sacred, and tolerated notwithstanding their depredations. Many species attain to considerable dimensions.

The Semnopitheci are all natives of India and its islands, and the Malay Peninsula.

140, 141.—The Kahau, or Proboscis Monkey

(*Semnopithecus larvatus*). This species is the Guenon à longue nez of Buffon, the Nasalis larvatus of Geoffroy, and the Nasalis recurvus (young) of Vigors and Horsfield. This monkey is remarkable for the uncouth development of the nose, forming a sort of proboscis capable of dilatation, with the nasal apertures underneath the bent-down apex, and divided from each other by a thin cartilage; along the upper surface of this singular organ runs a longitudinal depression, indicating the division between the two canals. The ears, which are small, and the face, together with the palms, are of a leaden colour, with a slight tinge of yellow; the neck is short; the throat swollen from the enormous laryngal sac. On the sides of the neck and shoulders the hair is long, compared with that of the rest of the body. The top of the head, the occiput, and the scapular portion of the back, are of a rich chestnut-brown; the sides of the face and a stripe over the shoulders are yellow; the general colour of the body is fine sandy-red. The crupper, the tail, the fore-arms, and legs are cinereous; the under parts are yellow; the tail is somewhat tufted at the tip. A full beard in the male advances forward, and curls up under the chin, almost to the long nose. In the young, regarded by some naturalists as a distinct species, the nose is somewhat recurved, and shorter than in the adult. That this distinction is not specific, as we ourselves formerly believed, we have fully satisfied ourselves by the examinations of specimens in Paris. Figure 142 represents the face of the adult kahau; 143, that of the young; 144, the nose of the adult as seen from beneath; 145 is the skull of the kahau; it has all the characters of a true Semnopithecus.

The male kahau is remarkable for size and strength, and, from the magnitude of the canines, must be a formidable animal. The female, however, is considerably smaller, a circumstance noticed by Wurmb, who says these monkeys "associate in large troops; their cry, which is deep-toned, resembles the word kahau. They assemble morning and evening, at the rising and setting of the sun, along the borders of rivers, and are to be seen on the branches of lofty trees, where they offer an agreeable spectacle, darting with great rapidity from one tree to another at the distance of fifteen or twenty feet. I have not observed that they hold their nose while leaping, as the natives affirm, but I have seen that they then stretch out their paws in a remarkable manner. They are of different sizes; some, indeed, are seen which are not above a foot in height, but which yet have young."

The kahau, as far as is known with certainty, is a native only of Borneo: perhaps it is to be found also in Sumatra. M. Geoffroy states it to inhabit the Malay Peninsula, but we are not aware that it has ever been seen there. The adult male measures two feet in the length of the head and body, and two feet four inches in that of the tail. It has never been brought alive to Europe.

146.—The Entellus, or Hoonuman

(*Semnopithecus Entellus*). The Entellus is a native of India and the adjacent islands. The general colour is straw yellow, more or less inclined to ashy grey; superciliary hairs black; hands and feet washed with black; face black. Length of head and body of adult male, two feet two inches; of tail, three feet one inch. The adults are paler than the young.

The Entellus, or Hoonuman, is held sacred in some parts of India, but not by the people of Mahratta, where it is called Mukur. It occurs in large troops in the woods of the Western Ghauts. In Lower Bengal, where it makes its appearance towards the latter end of winter (for it would seem that it migrates from the upper to the lower provinces, and vice versâ in this part of India), the pious Brahmins venerate it, supply it with food, and zealously endeavour to prevent its molestation by Europeans. According to Dr. Fryar and others, these monkeys, in Malabar, toward Ceylon, and at the straits of Balagat, are deified. At Dhuboy (see Forbes's 'Oriental Memoirs') they are, if not worshipped, protected, from motives of humanity to the brute creation and a general belief in metempsychosis. According to the latter author there are as many monkeys as human inhabitants in Dhuboy, and the roofs and upper parts of the houses seem entirely appropriated to their accommodation. To strangers they are unbearably annoying.

In Dhuboy, if a man wish to revenge himself on his neighbour for any insult or injury, he takes the opportunity, just before the periodical rains (about the middle of June) set in, and when the tiles have been adjusted to meet that season, of repairing to his neighbour's roof, and scattering over it a quantity of rice or other grain. This is soon discovered by the monkeys, who not only devour it, but pull up all the tiles in search of what has fallen through the crevices. At this critical juncture the rain commences; no one can be found to re-set the tiles; the house is deluged, the furniture ruined, and the depositaries of grain, generally formed of unbaked earth, soaked through by the falling torrent.

The celebrated banian-tree, on the banks of the Nerbuddah, is tenanted by hosts of monkeys and myriads of snakes. The antics and gambols of the former are very amusing; if they ever suffer from the snakes, they repay the poor reptiles with interest. When they see one asleep, twined round a branch, they seize it by the neck, and, descending, run to the nearest stone, and on it commence to grind down the reptile's head, frequently looking at it and grinning at their progress. When convinced that its fangs are destroyed, they toss it, writhing with pain, to their young, and seem to rejoice in its destruction.

Once a friend of Mr. Forbes, on a shooting excursion, killed a female monkey under this tree, and carried it to his tent, which was soon surrounded by forty or fifty of the tribe, who made a great noise, and with menacing gestures advanced towards it. On presenting his fowling-piece, they hesitated and appeared irresolute. But one, which from his age and station in the van appeared to be at the head of the troop, stood his ground chattering and menacing in a furious manner, nor could any efforts less cruel than firing drive him off. He at length approached the tent door, and by every token of grief and supplication seemed to beg the body of the deceased, which was then given to him; with every token of sorrow he took it up in his arms, embraced it with conjugal affection, and carried it off to his expecting comrades. The artless behaviour of this poor animal wrought so powerfully on the sportsmen, that they resolved never to level a gun again at one of the monkey race.

147.—The Black-crested Monkey

(*Semnopithecus melalophos; Cimepaye*, or *Simpai*, of F. Cuvier, not Raffles). This slender and beautiful species is a native of Sumatra. The head is small; the fur is long, soft, falling, and glossy; the top of the head is ornamented with a long compressed crest. The general tint is a fine bright golden rust colour, pure and rich on the limbs, but slightly washed with a dusky tint on the back; the abdomen and inside of the limbs are paler than the other parts. The crest is washed with a dusky tinge, passing into black at the tip. A black or blackish line beginning over the eyes passes across the temples, and turning up over each ear merges into the colour of the crest. The skin of the face is dusky-bluish; the palms, soles, and nails are black. Length of head and body, 1 foot 8 inches; of tail, 2 feet 8 inches.

This species has not, as far as we know, been brought alive to Europe. It is said to be extremely active, and to tenant the remote parts of the forest; but of its exclusive habits nothing is known.

148.—The Budeng

(*Semnopithecus Maurus*). The Budeng is a native of Java; the general colour is black; the fur is long and silky; the hairs, diverging from the crown of the head, conceal the ears. The young after birth are of a pale reddish-yellow; first a grey discoloration appears on the hands; then this begins gradually to spread, extending to the shoulders and sides; as it spreads it becomes darker, and at last passes into black. The budeng, according to Dr. Horsfield, is grave, sullen, and morose: it is abundant in the extensive forests of Java, where it associates in large troops, often of more than 50 individuals. On the approach of man they set up loud screams, and so violent and incessant are their motions, that decayed branches are often detached and precipitated on the spectators. The natives chase them for the sake of their fur, which is jet black, silky, and employed in riding equipages and military decorations. They are seldom kept alive, from the sullenness of their temper, which renders them anything but agreeable. While young they feed on the tender leaves of plants and trees; but when adult, on wild fruits of every description.

Genus Colobus.—The monkeys of this genus are restricted exclusively to Africa: in all respects they resemble the Semnopitheci, but the thumb which in the latter is small, is in these wanting or reduced to a mere nailless tubercle. What the Semnopitheci are in India, the Colobi are in Africa. Till lately only two species were known; but the list now contains ten accredited species, to which others will no doubt be added as we extend our researches in Western Africa, along the borders of the Gambia, and the island of Fernando Po.

149.—The White-thighed Colobus

(*Colobus leucomerus*, Ogilby). This beautiful monkey is a native of the banks of the Gambia. The fur is long, fine, silky, and shining; the general colour is black; a white frontal band spreads from the forehead over the whiskers on the sides of the face, and passing down occupies the throat, so that the face is surrounded with white, which is narrowest on the forehead. The hairs covering the thighs externally are white, more or less mixed with black, and gradually merging into the general hue. The tail is long and of a snowy white.

The White-thighed Colobus has never been observed by European travellers in its native forests; the skins, mostly imperfect and wanting the head, are brought down by the negroes from the interior for the purposes of barter. Nothing respecting its habits has been ascertained.

150.—Temminck's Colobus

(*Colobus Temminckii*, Kuhl, 'Beitr.,' 1820). The top of the head is black, as is also the occiput, which latter is slightly sprinkled with rufous; the back and the outside of the humerus and of the thighs are of a sooty black, with a tinge of slate blue. The sides of the face, the chest, the sides of the humerus, and the whole of the fore-arms are of a rufous colour, which becomes deeper and brighter on the hands; the anterior part of the thighs, the knees, and the legs are also rufous, the feet being of a deeper hue; the throat, together with a line along the chest and abdomen, are of a sandy-yellow; the middle of the chest and of the abdomen is abruptly of a dirty yellowish-white, varying to white; the tail at the base is black, with rufous hairs intermixed; it then assumes a chestnut red or rufous colour, becoming again darker at the extremity; an obscure dusky line runs along the whole of its upper surface. The naked skin of the face is brown, with a tinge of red purple; the palms and soles are of a purplish black. It was on a very pale-coloured and aged female of this species in the Museum of the Zoological Society, London (26, Cat., 'Mamm.,' 1838), brought from the river Gambia, that Mr. Ogilby founded his Colobus fuliginosus, afterwards termed by him C. rufo-fuliginus.

The original of Kuhl's description was formerly in Bullock's museum, but is at present in that of Leyden. With respect to the native country of this species, it is now ascertained to be Gambia. Length of head and body, 2 feet 2 inches; of tail, 2 feet 6 inches. Nothing relative to the habits and manners of this species, as it exists in its native forests, has been collected.

151.—FULL-MANED COLOBUS

(*Colobus polycomos*). *Full-bottomed Monkey*, Pennant; *Guenon à Camail*, Buffon. The Full-maned Colobus is a native of the forests of Sierra Leone. it is called by the natives 'the king of the monkeys,' on account of the beauty of its colours, and the *camail*, which represents a sort of diadem. Its fur is in high estimation, and applied to different ornamental purposes. The head and upper part of the body are covered with long hairs falling over the head and shoulders forming a sort of mane-like hood and pelerine, whence the name given to it by Buffon. Pennant's title is in allusion to the full-bottomed periwig worn in his day. These long hairs are mingled yellow and black; the face is brown, the body covered with short jet-black hair, the tail is snowy-white and tufted.

152 —THE GUEREZA

(*Colobus Guereza*) General colour black, sides of the body and top of the loins ornamented with long pendent white hairs, forming a fringe-like mantle, face encircled by white, tail ending in a white tuft. Native country, South and West Abyssinia

The Guereza, which is the Abyssinian name of this species, lives, according to Ruppell, in small families, tenanting the lofty trees in the neighbourhood of running waters. It is active and lively, and at the same time gentle and inoffensive Its food consists of wild fruits, grain, and insects It is only found in the provinces of Godjam, Kulla and Damot, more especially in the latter, where it is hunted by the natives, who consider it a mark of distinction to possess a buckler covered with its skin, the part used being that covered with the long flowing white hairs. Ludolph (in the 'Hist. Æthiop,' lib i) has made express allusion to this animal, but he figures a different species under its name

Genus *Cercopithecus*. In this genus are comprehended the ordinary long tailed monkeys or Guenons of Africa The muzzle is moderately prominent, the facial angle 45° to 50°, the head is round, the superciliary ridge moderate, the molar teeth are crowned with acute tubercles, the last molar of the lower jaw with only 4 tubercles there are ample cheek pouches, the laryngal sac is variable; ischiatic callosities moderate, general contour light, but vigorous, limbs muscular, stomach simple, tail long, the hairs composing the fur annulated

The Cercopitheci are all restricted to the African continent, but one species only, the Vervet (C pygerythrus, and one species of Baboon, the Chacma), inhabits Africa south of the tropic of Capricorn, and one species, the White-throated Monkey, C albogularis is a native of Madagascar These animals are arboreal in their habits, they tenant the wild forests that skirt the rivers, and associate in troops being gregarious in their habits. Their actions are full of energy, their disposition is restless, petulant, and inquisitive During infancy they are gentle, but as age advances they become irascible and malicious Their displeasure is expressed by grinning and chattering, and though they seldom venture to make a decided attack, yet collected in troops in their native woods, they endeavour to harass and annoy intruders within their territorial domains, and are not to be repelled without difficulty Their diet is almost exclusively frugivorous, and they often commit great havoc in the fields of grain adjacent to the wooded districts, and that, not only by what they devour on the spot, but also by what they carry away in their cheek pouches, which extend below the angle of the lower jaw, and which, when an opportunity occurs, they cram with food to be eaten at leisure In these Guenons the thumb of the fore-hands is more developed than in the Semnopitheci, and the hands themselves are shorter, and have better pretensions to the title than the long slender graspers of their Asiatic relatives The Dental formula is as follows —Incisors $\frac{4}{4}$, canines $\frac{1-1}{1-1}$, molars $\frac{5-5}{5-5} = 32$. Of these the canines (see figure 153) are very large, compressed, with a sharp cutting edge posteriorly

154 —THE MONA

(*Cercopithecus Mona*) La Mone of Buffon, the Varied Ape of Pennant The hairs annulated with grey, yellow, and black, or with red and black, producing the various tints of the fur. Head of yellowish-olive colour, a black frontal stripe above the eyebrows is surmounted by another of a whitish tint, more conspicuous in some individuals than in others, back chestnut-brown, haunches and limbs externally dusky black, tail black, with a white spot on each side of its origin on the crupper. under parts and inside of limbs white, whiskers very full, of a yellowish-tint, slightly washed with black, skin of orbits and cheeks bluish-purple; lips flesh coloured, ears and head of a livid flesh-colour; length of head and body 1 foot 8½ inches; tail 1 foot 11 inches. The Mona is a native of Western Africa (Guinea), but of its manners in a state of nature little is known. It bears our climate better than most of its congeners. we have observed many adults in captivity, and, always found them savage and irritable.

The term Mone, or Mona, is of Arabic origin, and is the Moorish name for all long-tailed monkeys indiscriminately. From Northern Africa the term passed into Spain, Portugal, and Provence, nor has it stopped here it is evidently the root of our word Monkey, which has exactly the same meaning, but which has been supposed to be a corruption of the word *monikin*, or *manikin* To say no more, it seems going out of the way to seek in our own language for the name of a foreign animal, with which our Saxon forefathers, and indeed ourselves, till at a comparative late era, were unacquainted, and which, when imported, was so with the name also, by which it was known to the people from whom it was originally obtained

155, 156 —THE GREEN MONKEY

(*Cercopithecus Sabæus*). The St Jago monkey of Edwards, Le Callitriche of Buffon, Cerc viridis of Hermann The general colour of the upper parts is olive-green, the hairs being annulated with black and yellow, on the outer side of the limbs a greyish tint prevails, the hands and feet are grey, the under surface of the body and inside of the limbs are white with a faint tinge of yellow The hairs on the side of the face are full and long, and directed up towards the ears, spreading in the manner of a frill, their colour, with that of the hairs of the throat, is bright but delicate yellow The tail is olive green above, passing into yellow at the tip, the face ears, and palms are black

The Green Monkey is a native of Senegal and the Cape de Verd Islands. It is most probable that this is the species to which Adanson refers, under the name of Singe verte, as being abundant in the woods of Podor along the Niger, and of which he killed twenty-three in less than an hour and in the space of twenty fathoms, without one of them having uttered a single cry, although they collected several times, knitting their brows, gnashing their teeth, and making demonstrations of an intended attack ('Voy au Senegal' by M Adanson, 1757)

In captivity the green monkey is alert, active, and intelligent, but spiteful and malicious F Cuvier, however, describes an adult which was good-tempered, gentle, and familiar, and expressed pleasure on being caressed such exceptions are rare

157 —THE DIANA MONKEY

(*Cercopithecus Diana*) *Le Roloway ou Palatine* of Buffon, *the Palatine and Spotted Monkey* of Pennant and Shaw The top of the head the back of the neck, the shoulders, sides, and middle of the body are of a deep grizzled ashy grey, the hairs being annulated with white and black and white at the lips This grey tint darkens into black on the hands, the tail is grey, becoming black at the extremity, a crescent-shaped line of long white hairs (surmounting a band of dusky black) and resembling Dian's silver bow, has suggested the animal's name The sides of the face are covered with long bushy white hairs which merge on the chin into a long, thin, flat, and pointed beard The front of the neck and the anterior part of the humerus are white, the latter with an abrupt line of demarkation

On the middle of the back commences a mark of deep chestnut, which gradually widens as it descends to the root of the tail forming an elongated triangle with the base on the crupper A line of white beginning at the root of the tail runs obliquely along the outer side of each thigh to the knee, the lower part of the abdomen and the inner side of the thighs are abruptly of an orange-yellow, orange red, or bright rust colour The face is long and triangular, and, together with the ears intensely black Length of head and body about 2 feet, of tail about 2 feet 4 inches This richly coloured monkey is a native of Guinea, Congo and Fernando Po It is very rarely brought alive to Europe, nor indeed are its skins common in collections We have observed only one specimen in the Paris Museum, from the Gold Coast Three specimens are in the collection of the Zoological Society London Of these, one died some years since in the menagerie of the Society the other two were brought from Fernando Po Of the habits of the Diana in its own forests we know nothing While young in captivity it is gentle, active, familiar, and very playful its frontal crest, and 'beard of formal cut," give a singular aspect to its physiognomy. The latter it has been observed to be solicitous in keeping neat and clean, holding it back when about to drink, lest it should dip into the fluid Considering the range of country through which this species is spread, the scarcity of this monkey in the menageries and collections of Europe is rather surprising

158 —THE LESSER WHITE-NOSED MONKEY

(*Cercopithecus Petaurista*). *Blanc-nez* of Allamand, *Ascagne* of F Cuvier and Audebert.

There are two distinct species of White-nosed monkey, both natives of the forests of Guinea, of these one is the Hocheur of Audebert, the Winking monkey of Pennant, the Cercopithecus nictitans of Geoffroy. The general colour of the Hocheur is black, freckled with white, the limbs are black, the whiskers, of the general colour, are ample, the chin is beardless, the nose, which is broad and elevated, is white from between the eyes to the nostrils.

The Lesser White-nosed Monkey, or Blanc-nez (see Fig 158), has only the lower half of the nose white, but this colour extends to the adjacent part of the upper lip, the face is covered with short black hairs, those on the cheek-bone having a fulvous tinge, the whiskers and beard are white, as also the throat, chest, and abdomen A streak of black hair runs from the face below the ear, and loses itself on the top of the shoulder, and between this black line and the hairs of the head a conspicuous streak of white runs below the ears The general colour of the back and head is reddish olive-brown, the hairs being ranged with fulvous and black A band across the forehead above the eyes, and a band traversing the top of the head from ear to ear, are black, a grey tint prevails on the limbs, deepening to dusky black on the hands and feet Tail dusky grey above, white beneath Length of head and body, about 1 foot 4 or 5 inches, of the tail, 1 foot 9 or 10 inches

This species is common in Guinea, and is frequently brought to Europe but does not well endure our uncongenial climate It is gentle, graceful, and intelligent, but not without a mixture of the caprice and petulance of its race The lightness and agility of its actions its playfulness, and beauty, certainly render it very attractive, but it dislikes to be taken hold of or interfered with so that though as docile as most monkeys, it becomes familiar only to a certain extent. A Blanc-nez in the possession of Allamand, though usually good-tempered and sportive, became angry if interrupted while feeding, and also when mockery was made of it We have observed a sensitiveness to ridicule or mockery in other species, and a strong desire to resent the insult, which is evidently felt

159 —THE COLLARED WHITE-EYELID MONKEY

(*Æthiops torquatus*) *Cercocebus Æthiops*, Geoff, *Cercopithecus Æthiops*, Kuhl In Martin's 'Natural History of Quadrupeds,' p 508 a subgenus termed Æthiops is there proposed for two, if not three closely allied species (the White-eyelid Monkeys) which differ on tangible grounds from the Cercopitheci, namely, in the presence of a fifth tubercle on the last molar of the lower jaw,* the magnitude of the upper middle incisors, and the hairs being destitute of annulations For these monkeys with other Guenons by no means closely allied to them, Geoffroy proposed his genus Cercocebus—a genus, the indeterminate characters of which from the incongruity of the species thus brought together was perceived by Desmarest who, unwilling to sink it, endeavoured to reform it by the removal of some species and the addition of others so that the genus as instituted by the one naturalist and that remodelled by the other, were two different assemblages and the characters of both equally vague and indefinite It therefore seems best to sink the genus altogether and place the White eyelid Monkeys in a separate subgenus, to which the title *Æthiops* has been already applied.

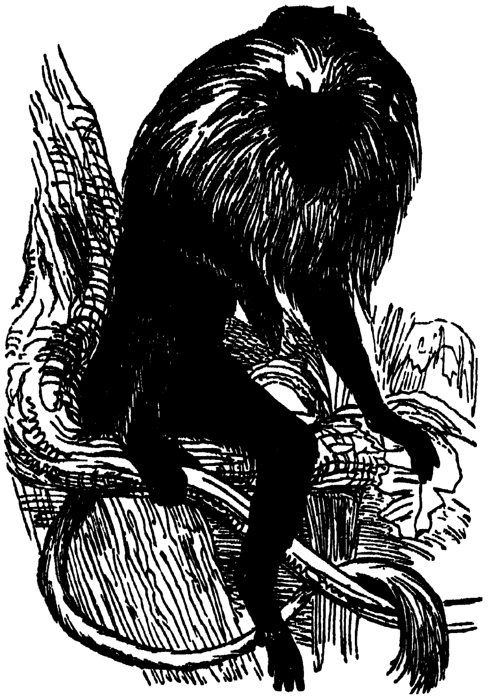
The Collared White eyelid Monkey (the Mangabey à Collier of Buffon and F Cuvier), like the Sooty White eyelid Monkey, is a native of Western Africa The general colour is fuliginous or sooty black passing into black on the limbs and hands The top of the head is chestnut-coloured, the whiskers throat, and collar round the neck are white The upper eyelids are conspicuously dead white

The native habits of this monkey are not known. in captivity it is gentle, active, and familiar, and testifies by a sort of jabber and grin its recognition of those for whom it has a partiality We have observed many individuals, and have found them to be among the most diverting of their race They would play a number of amusing tricks in order to attract the attention of bystanders, and gain a share of the nuts and biscuits they saw dealt out to their companions, and they testified their gratitude by a quick vibratory movement of the lips, producing a jabbering noise When offended, their ill-temper was transient, and they soon became reconciled to the object of their anger In their gambols with other monkeys they were invariably good-natured

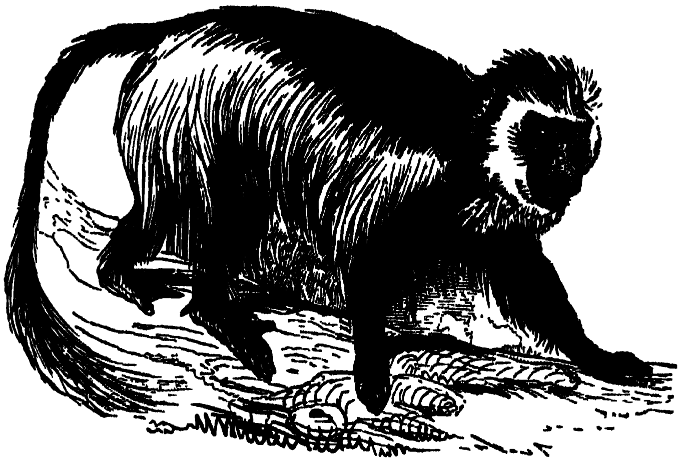
Genus *Macacus* The distinctions between the genus Macacus and Cercopithecus, though in some points definite, are in others rather variations in

---

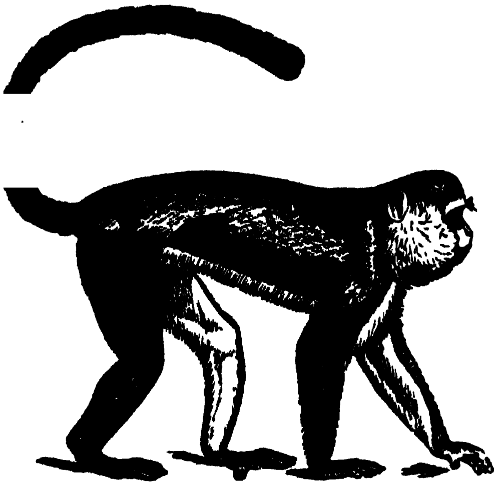
* See 'Proceedings of *Zoological Society*, London,' 1838 p. 117.



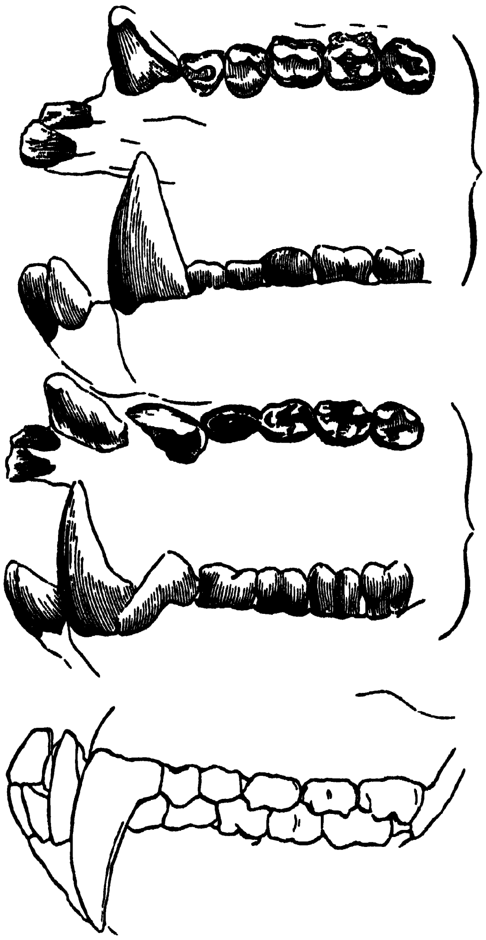
151.—Full-maned Colobus.



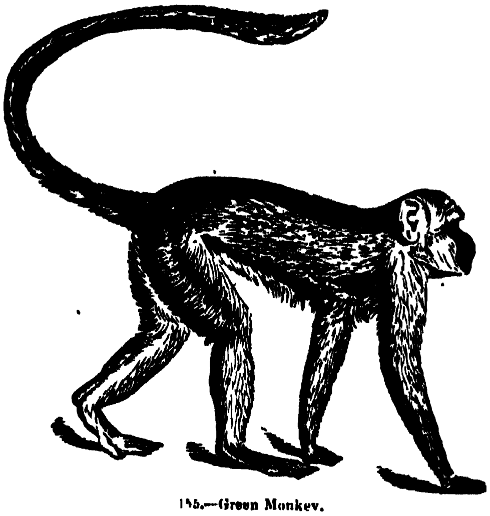
152 —Guereza



154 —Mona.



153 —Teeth of Guenons.

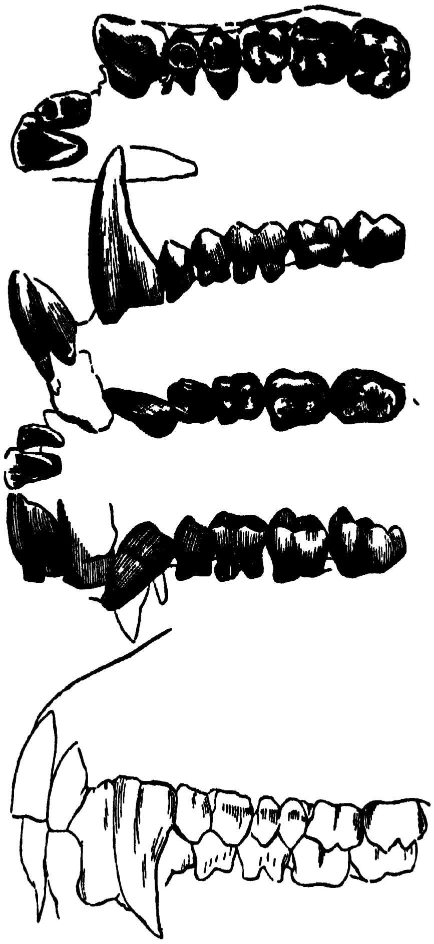


155.—Green Monkey.

157.—Diana Monkeys.

156.—Green Monkey.

161.—Toque



160.—Teeth of Macacus

159.—The Collared White Eyelid Monkey

158.—The Lesser White-nosed Monkey

164.—Wanderoo

162.—Rhunder.

163.—Wanderoo

165.—Chacma

degree than anything positive. In the Macaques, or Macaci, the body is stouter, the head larger in proportion, the limbs more muscular, and the tail shorter than in the Guenons. The muzzle is heavy; the forehead is flattened behind a bold superciliary ridge; the callosities are large, and mostly surrounded by a naked space of skin. There are ample cheek-pouches, and Cuvier states that a laryngal sac is always present. The last molar of the lower jaw has a fifth tubercle, and the molars are broad (see Fig. 160). The tail is variable: in some it is of considerable length, and in these the general form approaches to that of the Guenons. In others again it is short and slender; and in others it is reduced to a mere tubercle. The ears are angular. The Macaci are all natives of Asia. Like the Guenons, which they seem to represent, the long-tailed species tenant the forest in troops, and are remarkable for activity and impudence. Emboldened by tolerance, they become in many places very audacious, pillaging the garden and fields of grain, and their rapacity is seconded by address and cunning.

161.—The Toque, or Radiated Macaque

(*Macacus radiatus*). This species is the Bonnet Chinois of Buffon; the Simia Sinica of Gmelim; the Toque of F. Cuvier.

The forehead is abruptly depressed behind the superciliary ridge, which is very bold; the skin of the forehead is transversely wrinkled, and covered with short hairs, diverging laterally on each side from the middle longitudinal line. These hairs are continued round the temples, following the projection of the superciliary ridge, and occupying the space before the ears. A circular cap of rather long hair radiating from the centre is seated flat on the crown. The muzzle is prominent, and the physiognomy malicious; the form is robust; the tail long. The general colour is greenish olive-grey, the hairs being annulated with dusky-black and pale yellow; the under surface is ashy-white; the ears are large and flesh-coloured, with straggling long grey hairs. The limbs are of a paler tint than the back. The sides of the face and throat are thinly clad with greyish hairs; the naked skin of the face is of a tanned flesh-colour.

The Toque is one of the commonest of the Macaques in our menageries, and appears to be widely distributed throughout India. It is found in Malabar. It inhabits the Western Ghauts, where it is called Waanur by the Mahrattas: it is abundant in Madras, and even in the southern regions of Nepâl. In the Mahratta country portions of the mighty forest are, as Mr. Elliot states, left untouched by the axe or knife, forming an impervious shade for the growth of the black pepper, cardamom, and maripalm (Caryota urens). These parts, called kans, are the favourite resort of wild animals: here the Entellus abounds, and its loud and piercing cries may be frequently heard sounding through the dense foliage: the radiated Macaque, also, which is common over the whole country, may be seen in troops, tenanting the wildest jungles. It is not, however, confined to these woodland recesses: it lives, as if at home, in the most populous towns, where it carries off fruit and grain with the greatest coolness and address, and commits incessant petty depredations. The examples of this species which we have seen in captivity, have been all remarkable for intelligence and activity, and equally so for petulance when young, and irascibility—even ferocity—when adult. We have seen them display every mark of rage against persons who did not appear to give any definite offence. Numbers of these animals are kept in the Hindoo temples, where they are exceedingly jealous of intruders of any other species, which they drive forth from their asylum with the utmost hostility, a circumstance witnessed by M. de Maisonpré in the enclosures of the pagodas of Cherinan.

162.—The Bhunder, or Rhesus

(*Macacus Rhesus*). This is the Patas à queue courte of Buffon; the Maimon, or Rhesus, of F. Cuvier.

The general colour of the fur is olive-green, with a wash of brown on the back; the crupper and thighs externally orange-red; the face orange-red; the callosities and naked skin around intense red. The tail short. The skin of the throat and abdomen is loose, and usually hangs in folds. The Bhunder is a native of India, and is very abundant on the banks of the Ganges, being greatly reverenced by the Hindoos. It swarms not only in the woods, but in towns and villages, tenanting the tops of the houses. It would appear from the account of Mr. Johnson, in his 'Indian Field Sports,' that in some places ample provision is made for the support of these animals. At Bindrabun, a town near the holy city of Muttra, more than a hundred gardens are cultivated, and all kinds of fruit grown, at the expense of pious and wealthy natives, for their supply. Not content with remaining outside the houses, they boldly invade the rooms and steal everything that tempts them, such as bread, sugar, fruit, &c., ransacking every place in their search. To injure one is not only to bring down the vengeance of the whole host, but, what is more, of the besotted natives, as was experienced by two young officers who imprudently fired while on a sporting excursion at one of these monkeys. They were mounted on an elephant, and no sooner was the profane assault committed than the inhabitants of Bindrabun rose incensed to the highest degree: they pelted the gentlemen and the elephant with bricks and stones, and drove them into the river: the two officers and the driver were drowned; but the elephant landed about six miles lower down the river, and was saved. In the district of Cooch Bahar a large tract of country is considered by the natives as in part the property of these monkeys; and therefore, when they cut the grain, they leave a tenth part piled in heaps for these creatures, which come down from the hills and carry off their allotted tithes.

In captivity the Rhesus, or Bhunder, displays cunning and sagacity; but is at the same time obstinate, savage, and irascible.

163, 164.—The Wanderoo

(*Macacus Silenus*). Ouanderou and Lowando, Buffon; Lion-tailed Baboon, Pennant and Shaw.

The general colour of this species is black; the tail is of moderate length and tufted at the tip; the face is encircled by a mane of long hairs of a whitish or light ash colour, sometimes pure white; the face is black; the callosities flesh-coloured.

This large and powerful Macaque is a native of Malabar and Ceylon. Knox, in his historical relation of Ceylon, evidently describes this animal. They are, he says, "as large as our English spaniel dogs, of a darkish grey colour, with black faces, and great white beards from ear to ear, which make them show just like old men. They do but little mischief, keeping in the woods, eating only leaves and buds of trees; but when they are caught they will eat anything. This sort they call in their language Wanderows."

In captivity, judging from the specimens we have seen, the Wanderoo is surly and unsocial, and disposed to tyrannise over the other inmates of its compartment. Of its manners in a state of nature we have no detailed account.

Genus Cynocephalus. In the massive Baboons composing this genus we find the characters of the Macaques exaggerated, so to speak, to their ultimatum, and consequently impressing us with an idea of degradation in the scale; we recognise an approach in form and aspect to the Carnivora, and on reflection appreciate the distance to which we have receded from the Chimpanzee.

Of large stature and prodigious force, the Baboons, though never voluntarily assuming an erect attitude, are to a great degree terrestrial, inhabiting rocky and mountain districts, rather than forests and woodlands. The head is heavy, not from cranial development, but from that of the face, which is prolonged and thick, resembling that of a mastiff, the muzzle being truncated, and the nostrils at its extremity.

The maxillary bones are more or less swollen, and the superciliary ridge beetles over the scowling eyes, giving an expression of brutal and revolting ferocity.

The neck and shoulders are voluminous; the chest is deep, and the great power and equal proportions of the limbs are favourable for quadrupedal movements. They climb trees with facility, but prefer craggy rocks and precipices, among which they dwell in security. In temper they are morose and daring, and their physical powers render them formidable. It is only during youth that they are tractable. They congregate in troops, and are bold and skilful in their predatory excursions.

To bulbous roots, berries, and grain, the Baboons add eggs, scorpions, and insects, as their diet; nor is it quite clear that they are not carnivorous as well as herbivorous. In domestication they relish cooked meat, and even devour raw flesh with avidity. They do not arrive at maturity till the seventh or eighth year of their age.

All the Baboons are African: one indeed, the Hamadryas, is found in the mountain districts of Arabia, as well as in those of Abyssinia, and was well known to the Egyptians.

165, 166, 167.—The Chacma

(*Cynocephalus porcarius*). The Singe Noir of Le Vaillant; the Choak-Kama of Kolbe; Papio Comatus, Geoffroy. About the shoulders and neck the hairs are long and mane-like; the general colour is grizzled dusky black, with a tinge of olive-green; the face is black, with a hue of violet; the upper eyelids are white; the tail descends to the hock-joint, and is carried arched yet drooping down, as in Figs. 166 and 167. The male attains the size of a large mastiff, and is very formidable. Length of adult nearly 3 feet, exclusive of the tail, which measures about 27 inches.

The term Chacma is a corruption of the Hottentot name T'chacamma for this species, which inhabits the rocky mountains throughout the colony of the Cape of Good Hope, where, in the remoter districts, it is very abundant, and well known to the farmers from the depredations it commits in their cultivated enclosures. In its mountain fastnesses it is safe from pursuit, and troops may be frequently seen on the overhanging rocks gazing at the traveller as he traverses the mountain passes.

An old male Chacma is more than a match for two large dogs; and the boors of the interior will rather venture their hounds upon a lion or panther than one of these animals. Yet to no animal do the dogs show a more inveterate hostility. Burchell states that on one occasion a small company of them, being chased by his dogs, suddenly turned upon their canine foes and defended themselves most effectually. They killed one dog on the spot by biting it through the great blood-vessels of the neck, and disabled another by laying bare its ribs. Even the leopard, hyæna, or wild-dog is sometimes mastered by a troop, though the former, surprising individuals, destroys numbers.

The devotion of the females to their young is very great, and in their defence they are ready to brave every danger.

The food of the Chacma consists in a great measure of bulbous roots, particularly of the Babiana; and it is customary for the troops to descend from the precipices into the secluded valleys of rich alluvial soil where these plants luxuriate. When suddenly surprised, the cry of alarm is raised, and the troop ascend the rocky cliffs, often several hundred feet in perpendicular height, with surprising agility, the young clinging to their mothers, and the old males bringing up the rear. Besides bulbs and grain, they are fond of eggs, and greedily devour scorpions, which they seize, nipping off the sting with so rapid an action as to prevent the hands from being wounded. In captivity, while young, the Chacma is good-tempered and frolicsome, but as age advances it becomes savage and dangerous.

168.—The Mandrill

(*Cynocephalus Mormon*). Le Choras, Buffon; Mantegar, Bradley; Great Baboon, Pennant; Variegated Baboon, Lev. Mus.; Ribbed-nosed Baboon, Pennant; Simia Mormon and Maimon, Linn.

Adult male. General colour olive-brown, passing into whitish in the under parts; a golden-yellow beard hangs from the chin; the hair of the forehead and temples converges to a peak; skin round the callosities red. The nostrils have a broad rim around them, at the extremity of the muzzle; the tail is short, and nearly hid by the fur. The cheek-bones are enormously swollen, rising like two ridges, and the skin is obliquely marked with deep furrows; its colour is a fine blue, with a tinge of scarlet in the furrows; a streak of brilliant vermillion, commencing on the beetling superciliary ridge, runs down the nose, and is diffused over the muzzle. Ears, palms, and soles violet black. In the female the cheeks are less swollen, and the scarlet is pale or wanting. In the young the cheeks are little if at all swollen, the furrows barely discernible, and the colour black. It is not until the fourth or fifth year, when the second dentition is fully complete, that the characters of maturity are assumed; and to this point there is a gradual progress, the bones of the face developing, the colour of the skin changing, the muzzle becoming broader and thicker, and the furrows more marked.

This massive, powerful, and ferocious baboon is of huge size, and very dangerous. It is a native of Guinea and other parts of western Africa, where it is greatly dreaded by the natives, who assert that it frequently attempts to carry off women into the deep forests where it resides, and occasionally succeeds. However this may be, certain it is that in captivity the appearance of a female will excite in the mandrill unequivocal manifestations of brute passion, and any attention to her the most furious jealousy.

In its native forests the mandrill associates in large troops, which are more than a match for the fiercest beasts of prey, and often make incursions into villages and cultivated fields, which they plunder with impunity. In their movements on the ground they are quadrupedal; but their activity is very great, and they leap and climb with the utmost facility. Their voice is deep and guttural, consisting of hoarse, abrupt tones, indicative of fury or malice. That the species is abundant in western Africa is proved by the numbers of young individuals brought from time to time to Europe; these however very rarely attain to maturity, the period of dentition, which is accompanied by such marked changes, being peculiarly critical. In captivity this baboon is ferocious and malevolent; one in the possession of Mr. Wombwell killed a monkey, a beagle, and a Java sparrow, which by accident came within his reach. A splendid specimen died some years ago in Mr. Cross's menagerie. He was accustomed to smoke, and to drink porter, which latter he quaffed with an amusing air of gravity, holding the mug with great address while seated in his arm-chair. His temper was violent in the extreme, and the slightest offence roused him to fury: his appearance was then terrible, and well calculated to alarm the boldest; nor could any man, without weapons, have had any chance in a contest.

169.—The Drill

(*Cynocephaelus leucophus*). The Drill is a native of Guinea. The head is large; the muzzle thick, with elevated maxillary protuberances, which, however, are not furrowed. The general contour is robust. The tail is very short, and carried erect. The general colour is greenish olive above, ashy white beneath; the beard is short and orange-coloured; the face and ears are glossy black; the palms copper-coloured. The female is smaller, with a shorter muzzle and paler tint of colouring. The young males resemble the female till their second dentition is complete. It would appear that the Wood Baboon, the Cinereous Baboon, and the Yellow Baboon of Pennant, are the young of the Drill at different stages of growth.

The Drill approaches the Mandrill in size; and though gentle when young, becomes when adult as sullen and ferocious as that animal. Adults are, however, rare in menageries, the acquisition of the permanent teeth being critical: but young specimens are far from uncommon. These have often been confounded with the young of the Mandrill; indeed, it is to Frederic Cuvier that we owe the recognition of the Drill as a distinct species, for the confused descriptions of Pennant afford us nothing tangible. In its wild state the Drill resembles the Mandrill as regards habits and manners; and travellers seem to have confounded the two species together, and even mixed up their history with that of the Chimpanzee.

AMERICAN MONKEYS

(*Cebidæ*). The American monkeys differ from the monkeys of the Old World in the following particulars. The thumb of the fore-hands is never opposable to the fingers.

The dentition, excepting in the Marmozets, is as follows:—Incisors, $\frac{4}{4}$; canines, $\frac{1-1}{1-1}$; bicuspid molars, $\frac{3-3}{3-3}$; true molars, $\frac{3-3}{3-3} = 36$, instead of 32. Callosities always wanting. Cheek-pouches always wanting. Nostrils lateral, with elevated margins, and separated from each other by a wide septum. Tail often prehensile, never wanting or rudimentary.

The American monkeys, or Cebidæ, are exclusively confined to the warmer regions of the New World; so that, although the species are numerous, their extent of territory is far more limited than that occupied by the Old World monkeys. Their northward range is bounded (in the tenth or eleventh degree of latitude) by the Caribbean Sea; for they occur neither in the Caribbean group of islands, nor in Hayti, Cuba, or the Bahamas. Though found in the region south of the territory of Panama, they do not advance to Yutacan or Mexico. South of the line their range extends to the twenty-fourth or twenty-fifth degree of latitude, including Brazil, Peru east of the great chain of the Andes, and Paraguay. All are arboreal, frequenting the dense forests, which, as Humboldt observes, are so thick and uninterrupted on the plains of South America between the Orinoko and the Amazon, that, were it not for intervening rivers, the monkeys, almost the only inhabitants of these regions, might pass along the tops of the trees for several hundred miles together without touching the earth.

In South America monkeys are ordinarily killed as game by the natives for the sake of their flesh; but the appearance of these animals is so revolting to Europeans, that it is only from necessity, and after custom has familiarised the sight, that they can force themselves to partake of such fare. The manner in which these animals are roasted also contributes to render their appearance disgusting. "A little grating or lattice of very hard wood is formed and raised a foot from the ground. The monkey is skinned and bent into a sitting posture, the head generally resting on the arms, which are meagre and long; but sometimes these are crossed behind the back. When it is tied on the grating, a very clear fire is kindled below; the monkey, enveloped in smoke and flame, is broiled and blackened at the same time. Roasted monkeys, particularly those that have a round head, display a hideous resemblance to a child; the Europeans, therefore, who are obliged to feed on them, prefer separating the head and hands, and serve only the rest of the animal at their tables. The flesh of monkeys is so dry and lean, that M. Bonpland has preserved in his collection at Paris an arm and hand which had been broiled over the fire at Esmeralda, and no smell arises from them after a number of years."—Humboldt.

Genus Ateles. This genus, which includes the spider-monkeys, is characterised thus:—Head round; face moderately developed; limbs long and slender. Tail longer than the body, thick at the base, strongly prehensile, and naked for a considerable space beneath at its extremity. Fore-hands either destitute of an externally apparent thumb, or with the thumb a mere tubercle. Nostrils separated by a wide septum and obliquely oval. Ears moderate, naked, with reflected margins. Dentition as described. Fur long, crisp, or rather harsh, sometimes silky; prevailing colour black.

In the slenderness of the limbs, and in the staid, quiet, and almost melancholy expression of the face, the Spider Monkeys remind us of the Gibbons; both are timid and gentle, with an air of listlessness, lost only under excitement.

From the length of the limbs and the remarkable flexibility of the joints, the motions of the Spider Monkeys on all fours on the ground seem to be crawling and indeterminate. They tread on the inner edge of the fore-paws, and to a great degree on the outer edge of the hind-paws, and endeavour to assist themselves by attaching the tail to every object as they proceed. They often, however, assume the erect attitude, and walk thus better than any other of the long-tailed monkeys. When proceeding in this manner the tail is raised up as high as the shoulders, and then bent downwards at its extremity, evidently acting as a balancer while the animal moves steadily along. The proper place of these monkeys is among the branches of the forest; there their movements are rapid, easy, and unconstrained; their progression is by a series of swinging evolutions, in the performance of which the limbs and tail take an equal share. The latter organ, the strength and prehensile powers of which are very great, enables them to assume the most varied attitudes. In ascending or descending trees, or in traversing the branches, it is in continual requisition; they coil it round branch after branch in their passage, turning it in various directions, and applying it with wonderful precision. They often suspend themselves exclusively by it, and swinging until a sufficient impetus is gained, launch themselves to a distant branch, or, stretching out their arms, catch it as they vibrate towards it. The advantages of this additional instrument of prehension are palpable; its sense of touch is finger-like; and it is capable of seizing small objects with great address. They are said to introduce the extremity of the tail as a feeler into the fissures and hollows of trees, for the purpose of hooking out eggs or other substances.

170.—The Chameck

(*Ateles subpentadactylus*). Fur long, flowing, glossy, and jet black. The fore-hands have a minute nailless tubercle in place of a thumb. The face and ears are naked, and of a red flesh colour, with a tint of dusky brown. Length of head and body about twenty inches: of the tail twenty-five inches. Native country, Peru.

171.—The Marimonda

(*Ateles Belzebuth*, Desm.). Fur smooth and glossy; general colour brownish black, deeper on the hands and feet, but fading on the loins and sides of the haunches to a glossy greyish brown. The long hairs at the angle of the jaw, those of the throat, under parts and inside of the limbs, dirty straw colour or yellowish white. A space along the under surface of the tail at its base rusty yellow. Skin of the face blackish brown, becoming of a tanned flesh colour about the lips and nose and around the eyes. Native country, the borders of the Orinoko, Cassiquiare, &c.

172.—The Coaita

(*Ateles Paniscus*). The Quatto of Vosmaer. General colour black, the fur being long, coarse, and glossy; more scanty on the under parts of the body than on the upper. Face and ears of a flesh colour, with a tanned or coppery tinge. Neither in this nor the Marimonda is there any thumb on the fore-hands. Native country, Surinam and Guiana.

In their general habits and manners these three species of Spider Monkeys agree so closely that the details of one are applicable to the rest. In captivity the Chameck is grave and gentle, but displays extraordinary agility; its intelligence approaches that of the Gibbons. We have seen individuals repeatedly walk upright with great steadiness,—cross their compartment to the window, and there gaze for a considerable time with an air amusingly like that of a human being, as if contemplating the state of the weather, the progress of vegetation, or the actions of persons passing by. At the same time the Chameck (and the same observation applies to the others) is not disposed to court the notice of the spectators around it, or invite the attention of strangers. Towards those by whom it is regularly fed it displays confidence and partiality. In its gambols with others of the genus it exhibits great address in avoiding or returning their sportive assaults, and executes with surpassing ease the most fantastic manœuvres.

The Marimonda is termed Arù by the Indians of the Rio Guiania, and is a favourite article of food with the natives of the borders of the Cassiquiare, the higher Orinoko, and other rivers, and its broiled limbs are commonly to be seen in their huts. It is listless and indolent in its habits, and is fond of basking in warm rays of the sun. Humboldt states that he has frequently seen these animals, when exposed to the heat of a tropical sun, throw their heads backwards, turn their eyes upwards, bend their arms over their backs, and remain motionless in this extraordinary position for hours together. They traverse the branches leisurely, and unite in companies, forming the most grotesque groups, their attitudes announcing complete sloth.

In captivity the Marimonda is gentle, and exhibits nothing of the petulance of the guenons or the violence of the macaques. Its anger, when excited, is very transient, and announced by pursing up the lips and uttering a guttural cry, resembling the ou-ó. Humboldt notices the facility with which this animal can introduce its tail into the narrowest crevices, select any object it pleases, and hook it out.

173.—The Miriki

(*Eriodes tuberifer*, Isid., Geoff.). Ateles hypoxanthus, Prince de Wied-Neuwied, but not of Desmarest. The Miriki and one or two more species have been recently separated from the genus Ateles and formed into a distinct group. There are indeed several differences between these animals and the ordinary Spider Monkeys, which, if taken together, justify the adoption of the genus Eriodes. The nostrils are rounded, the interval between them is narrow, and their aspect is downwards, not lateral. The molar teeth, instead of being small, are large and quadrangular, and the crown of the first two molars of the upper jaw is boldly and irregularly tuberculate: the incisors are small. The dentition in fact approaches close to that of the Howlers (Mycetes), and it is worthy of remark that, in F. Cuvier's work on the teeth of quadrupeds, his figure of the teeth of the Howling Monkeys is in reality copied, as M. Isidore asserts, upon his own knowledge, from the teeth of a species of Eriodes. (See Fig. 174.) Besides these there are other characters of minor importance.

The fur of the Miriki is soft and woolly, of a yellowish-grey, the base of the tail and the circumjacent hairs being tinged with rufous. The fore-hands are furnished with a minute rudimentary thumb, in the form of a nailless tubercle; the face is flesh-coloured, sprinkled with greyish hairs. Native country, Brazil. The Miriki in its general habits agrees with the Spider Monkeys. It lives associated in troops in the vast forests, and displays great agility. Fruits form its principal diet. The Prince of Weid-Neuwied states that the Miriki seldom approaches the abodes of man, keeping to the depths of the woods; Spix also states that it lives in troops which make the air resound with their loud cries incessantly uttered during the day. At the sight of the hunter they ascend with extraordinary rapidity the topmost branches of the trees, and passing from one to another are soon lost in the recesses of the forest. The Brazilians call this monkey Miriki and Mouriki; the Botacudas term it Koupo.

Genus Mycetes. The Howlers, or Howling Monkeys, as the animals of this genus are termed, constitute a natural and well-marked group distinguishable from the Spider Monkeys by their greater robustness, by the more proportionate contour of the limbs, by the development of the bone of the tongue (os hyoides), which is greatly enlarged and hollow, by the expansion of the lower jaw, especially at its angle, the prominence of the muzzle, and by the possession of a thumb (not opposable) on the fore-hands. The form of the head is pyramidal; the fur of the forehead is directed upwards, that of the rest of the head forwards; on the external surface of the fore-arms it is directed from the wrist to the elbow; the under parts of the body are almost naked; on the back and shoulders the fur is full, long, soft, and glossy. The tail is strongly prehensile, and naked at its extremity beneath. The hollow drum formed by the os hyoides communicates with the interior of the cartilaginous expansion of the larynx (Fig. 175), in which are several membranous valvular pouches. This apparatus gives to the voice extraordinary volume and intonation. The howlings uttered by the troops of these monkeys are astounding, and usually heard in the morning, at sunset, and during the darkness of night. Shrouded amidst the gloomy foliage of the woods, they raise

166.—Chacma.

171.—Marimonda.

168.—Mandrill

169.—Drill.

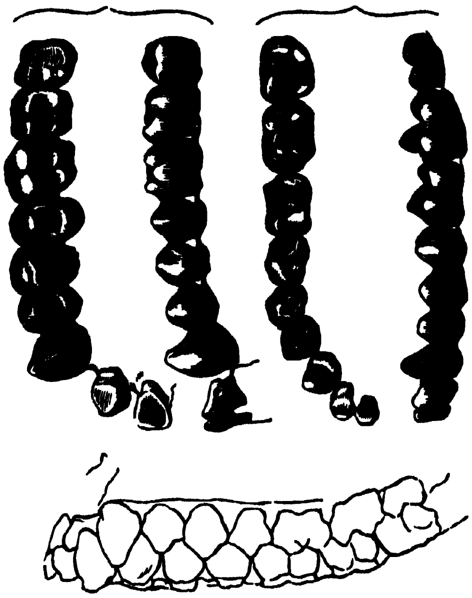
167.—Chacma.

172.—Coaita.

173.—Miriki.

170.—Ch [illegible]

176.—Araguato.



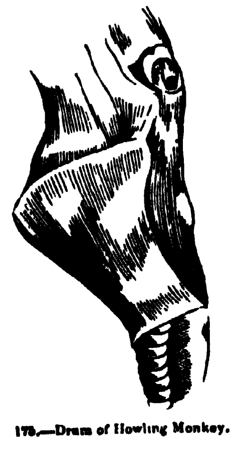
174.—Teeth of Howling Monkey.

180.—Brown Sajou.

177.—Araguato.

178.—Horned Sajou.

179.—Yellow-Breasted Sajou.



175.—Drum of Howling Monkey.

their horrid chorus, "making night hideous," and startling the traveller who for the first time hears it. It is not, however, only during the night or at daybreak and evening that the Howlers exert their voices; they are affected by electric changes in the condition of the atmosphere, and when, during the day, the gloomy sky foretels the approach of a thunderstorm, their dissonant yells resound through the gloomy woodlands. The range of the Howlers is from Guiana to Paraguay. According to Spix and Humboldt, they subsist principally upon fruits and leaves. The females produce one at a birth, and the mother carries her young clinging to her back until old enough to act for itself. In their disposition the Howlers are melancholy and morose; their movements are tardy and inert; on the ground they never attempt to walk on the hinder limbs alone. When pursued or alarmed, they retire slowly and take refuge in the highest branches of the trees, to which, if shot with a bullet or arrow, they often remain suspended by the tail when life is extinct. As they are of large size and fatter than other monkeys, they are in great request with the Indians as food; but are seldom or never kept in confinement, having nothing pleasing in their manners, voice, or appearance.

176, 177.—The Araguato, or Ursine Howler

(*Mycetes ursinus*). Araguato de Caracas of Humboldt. The extent of the face destitute of hair is more circumscribed than in most of the genus, and is of a bluish black colour with long scattered black bristles on the lips and chin. The chest and abdomen are well clothed with hair. The fur is long, resembling that of a young bear. The general colour is golden rufous, paler round the sides of the face, but deeper on the beard. In the figure of this species given in Humboldt's work, the hair of the head is represented as all directed backwards from the forehead to the back of the neck; we hesitate not to say, by a mistake of the artist. Native country, Brazil, Venezuela, &c.

It was after landing at Cumana, in the province of New Andalusia, that Humboldt and Bonpland first met the Araguato, while on an excursion to the mountains of Cocollar and the cavern of Guacharo. The convent of Caripé is there situated in a valley, the plain of which is elevated more than 400 toises above the level of the ocean; and though the centigrade thermometer often descends during the night to 17 degrees, the surrounding forests abound with Howlers, whose mournful cries uttered when the sky is overcast, or threatens rain or lightning, are heard at the distance of half a league. The Araguato was also met with in the valleys of Aragua to the west of Caracas, in the Llanos of the Apuré and of the Lower Orinoco, and in the Carib missions of the Province of New Barcelona, where stagnant waters were overshadowed by the Sagoutier of America, a species of palm with scale-covered fruit and flabelliform leaves, among which it dwells in troops. South of the cataracts of the Orinoco it becomes very rare. Of all the gregarious monkeys the Araguato was observed in the greatest abundance; on the borders of the Apuré Humboldt often counted 40 in one tree, and in some parts of the country he affirms that more than 2000 existed in a square mile. They travel in the forests in long files, consisting of 20 or 30 individuals or more, and proceed with deliberation. An old male usually leads the troop, the rest follow his movements, and when he swings from one branch to another, the whole file one by one perform in "order due" the same action on the same spot. In other species also this habit has been observed. According to Waterton, the Araguato is very partial to the seeds of the vanilla, a creeper which ascends the trees to the height of forty or fifty feet.

Genus Cebus. The Sapajous, as the animals of this genus are termed, are prehensile-tailed, but the tail is everywhere clothed with fur, so that, though capable of grasping, and naturally curled round at its extremity when not in use, as in the Spider Monkeys and Howlers, it is not, as in these latter animals, an organ of tact, nor so powerful a grasper.

The monkeys of this genus are all diurnal in their habits, and for the most part of small size. The French call them Sapajous, Sajous, Sais, and Capucins: they are also called Weepers (Singes pleureurs), from the plaintive piping noise which many of them utter. Humboldt states that the Creoles of South America call them "Matchi," confounding under this denomination very distinct species. In temper and disposition the Cebi are lively and docile; they show great attachment to some persons, and a capricious aversion to others. They are intelligent, mischievous, and inquisitive. Their activity and address are surprising; in their native forests they live in troops, feeding on fruits, grain, insects, and eggs. So amusing are they in their gambols, that even the apathetic natives will stop their canoes and watch their frolics with interest. They are, from their liveliness and docility, great favourites, and often kept domesticated, but their amusing habits do not protect them from the poisoned arrows of the Indians.

The head is round, the muzzle short, and the limbs well proportioned. The dentation as usual: the incisors of the upper-jaw are larger than those of the lower; the canines are often strong and large; the molars are rather small. The ears are rounded. The species are very numerous, and involved in much confusion.

178.—The Horned Sajou

(*Cebus Fatuellus*, Linn.). Sajou cornu, F. Cuvier (not of Buffon). The general colour of the fur is brown, deepening to an almost black tint on the top of the head, on the middle of the back, and on the legs, hands, feet, and tail. A bandeau of hair rises on the forehead, the extremities of which are elevated in the form of egrets, or pencil-like tufts: these tufts are less conspicuous in the female. The sides of the face are garnished with white hairs. All the naked parts, and the skin under the fur, are violet-coloured. Native country, Brazil: it is found in the Provinces of Rio Janeiro. It is not until maturity that the horns or frontal tufts are acquired. In captivity the Horned Sajou is lively and amusing, active and good tempered. Its habits in a state of nature are not detailed.

179.—The Yellow-breasted Sajou

(*Cebus xanthosternos*. Prince Maxim., Kuhl, Desmar.). Sai à grosse tête, Cebus Monachus, F. Cuv.; C. Zanthocephalus, Spix This is one of the species which has been in confusion, but from which we trust it is extricated. The head is large, the forehead broad and covered with very short hair; the limbs are robust, the tail thick: in size this species is superior to the Horned Sajou. The forehead and anterior part of the head, and the hairs of the cheeks, which are full on the malar bones, are yellowish white; a dusky line, commencing before the ears, encircles the face; the chest, the shoulders, and the anterior part of the humerus, are orange-yellow; the fore-arms, the legs, the anterior portion of the back, and the tail, are black; the sides of the body and the haunches are reddish-brown; the abdomen, rich rufous chestnut. The depth of the tints vary with age; the fore-arms and legs are often freckled with rufous and the tail grizzled with yellowish-white, especially at its base and underneath.

This species inhabits the woods of Rio Janeiro and St. Paul. We have seen a fine specimen from Bahia Brazil. It is a young male which F. Cuvier figures as the Sai à grosse tête He adds also the scientific appellation Monachus, which having been already given to a very distinct monkey (Cebus monachus, Fischer; Pithecia monachus, Geoffroy), cannot be retained without confusion. According to Spix the Yellow-breasted Sajou associates in large troops, which often visit the fields of maize, where they commit great depredations. In captivity it is gentle, mild, and confiding, and though timid, fond of being noticed by those to whom it is familiarized.

180.—The Brown Sajou

(*Cebus Apella*). Sajou brun, Buffon. Head round; colouring variable both as to intensity and markings. The following details are taken from specimens we have rigorously examined:—Hair of the temples short, scanty, and directed upwards. On the top of the head the hair is moderately long, and forms a cap with an anterior slightly elevated marginal ridge advancing from the centre of the forehead along the sides of the head, so as to produce a somewhat triangular figure; face covered with short dusky hair, that about the lips white: ears large and nearly naked. From the black cap on the top of the head a blackish line extends down before the ears and spreads over the beard-like hairs of the throat. The outer surface of the humerus is greyish, but a black line from behind the ears sweeps over the shoulder and runs along the anterior margin of the humerus to the fore-arm, which is black, grizzled with brownish grey. The general colour is brownish-black, passing into black on the middle of the dorsal line, on the haunches, tail, thighs, and legs: the fur is glossy. Another specimen has the sides of the body and outside of the thighs of a glossy pale chestnut brown, and the temples yellowish grey washed in the middle with black. The Cebus Apella is the Capucin Monkey of Pennant and Shaw, but not the Simia Capucina of Linnæus, which is the Saï of Buffon, the Weeper Monkey of Pennant and Shaw.

The Brown Sajou is a native of Guiana, and is plentifully brought over by vessels trading to the coast, so that it is common in our menageries. Its liveliness and activity are remarkable, and it bears our climate well. There are several instances of its having produced young in France, and each time a single offspring, to which both parents were strongly attached. In disposition the Brown Sajou is good-tempered, but capricious. It is very intelligent and amusing. A male which was living a few years since in the Gardens of the Zoological Society would employ a stone for the purpose of breaking nuts too hard to be crushed by the teeth, or if no stone were at hand he would strike them forcibly against any hard surface, so as to split the shell: we have seen other sajous do the same. This species is continually in the habit of making grimaces; it grins, wrinkling up the face in a very singular manner; its ordinary cry is plaintive, but when in anger the voice is shrill and elevated. In climbing, the tail is in constant requisition as a grasper. Though fruits and other vegetable productions constitute the diet of this species in its native forests, they are not exclusively so; insects are highly relished, and there is reason to believe that eggs and young birds are also acceptable. A linnet, which by way of experiment was introduced into a cage where two of these monkeys were confined, was instantly caught by the strongest of them, and killed and eaten with scarcely even the ceremony of stripping off the feathers.

Genus Pithecia. The Monkeys of this genus are termed Saki by the French. The tail is not in the slightest degree prehensile: it is shorter than the body, and generally bushy. The head is round, the muzzle moderately prominent. In the lower jaw the incisors project almost as in the Lemur, being compressed, narrowing at the points, and are closely compacted together; the upper incisors are nearly vertical and square, differing greatly in appearance from those of the lower jaw. The canines are large, strong, and three-sided. The molars bluntly tuberculate.

The Sakis, or Fox-tailed monkeys, live either in pairs, or small troops of ten or twelve, and are usually seen on the outskirts of forests bordering rivers They are to a certain degree nocturnal in their habits: some indeed have been considered decidedly so, but it would appear that, like the Howlers, they are the most animated just before sunrise and after sunset, at which times they utter their loud cries in concert. All are active and vigilant, and not easy to be surprised or captured.

181.—The Cacajao

(*Pithecia melanocephala*). This monkey is also called in America Caruiri. The body is rather robust, but elongated; the head is ovate, oblong, and depressed on the crown; the ears have a backward situation; the tail is short, and ends abruptly. The face is black, as are also the ears; the head is covered with full long black hairs, directed from the occiput forwards to the forehead, where they become parted in the centre. The hairs of the back are long, and of a brownish-yellow: this colour passes on the thighs and tail into a brighter or ferruginous tint. The fore-arms and legs are black or blackish. The chin is beardless, and the nose short, broad, and flat. Native country, the borders of the Cassiquiare and Rio Negro; and in Brazil, those of the rivers Solimoëns and Iça.

The present Saki is described by Humboldt, and is doubtless identical with one also described and figured by Spix, which he terms Ouakary, and which he found in the forests between the rivers Solimoens and Iça (Brazil). He states that these monkeys congregate in troops frequenting the margins of large streams; and that during their journeys from one part of the forest to another they fill the air with their piercing and disagreeable cries. Humboldt informs us that the Cacajao, or Cacaho, as it is called by the Marativitan Indians of the Rio Negro, is not common in the territories which he explored, for he only saw one individual, which he bought, in an Indian cabin at San Francisco Solano; and from which, after death, he took an accurate drawing. It was young, but he was assured by the Indians of Esmeralda, that though it attains to a considerable size, its tail is not sensibly augmented in length. According to the information obtained by Humboldt, the Cacajao inhabits the forests which border the Cassiquiare and Rio Negro, associating in troops: when kept in confinement it is voracious and listless, but gentle and timid, even shrinking from the society of other small monkeys. Baron Humboldt's specimen trembled violently at the sight of a crocodile or serpent. When irritated it opens its mouth in a strange manner, and its countenance becomes distorted by a convulsive sort of laugh.

From the length and slenderness of its fingers, it grasps anything awkwardly, and when about to seize an object, bends its back and extends its two arms, at the same time assuming a singular attitude. It eats all sorts of fruits—the most acid, as well as the sweetest. It is termed Caruiri by the Cabres of the mission of San Fernando, near the junction of the Orinoco, the Atabapo, and the Guaviare; Mono feo (hideous monkey), and Chucuto, or Mono rabon (short-tailed monkey), by the Spanish Missionaries of the Cassiquiare.

[illegible].—THE COUXIO, OR JACKETED MONKEY

Mem. Wern. Soc.,' this species has been The following are its bus Sagulatus, Fisch.; Cebus Sata- offmans; Pithecia Satanas, Kuhl and Geoffr.; Chiropotes, Humboldt; Pithecia Chiropotes, Geoffr., Kuhl, Desm.; Brachyurus Israëlita, Spix.

Head, limbs, and tail black,—the general tint of the back and top of the shoulders is grizzled rusty-brown or brownish-grey, differing in depth in different individuals. The hairs of the body are pale at the roots, sometimes indeed nearly white. The under parts are scantily clad. The hair of the head radiates from a point on the occiput, and on the sides of the forehead forms two conspicuous elevated tufts, with a depression between them. These tufts fold over and conceal the ears, which are black and naked. The face is black and furnished at its sides with full bushy whiskers which meet under the chin, forming an enormous glossy-black beard, directed obliquely forwards, and which gives a peculiar aspect to the physiognomy. The teeth are large,—the canines formidable. The head is large and rounded, and the nostrils very widely separated from each other. On the outer side of the fore-arms the hairs are reverted. Native country, Guiana and the borders of Rio Negro, &c. Of the four distinct specific appellations (viz. Sagulata, Satanas, Chiropotes, and Israelita), which we regard as belonging all to one animal, that of Sagulata claims the preference, being the name under which the species was first described by Traill. Baron Humboldt, who erroneously regards the Satanas of Hoffmansegg (which he calls Couxio de Grand Para) and his Chiropotes (which he terms Capucin de l'Orénoque) as distinct, thus describes the latter (a description applicable to each variety, under whatever name it may stand in the works of naturalists):—The Capucin de l'Orénoque (Couxio, P. Sagulata) is robust, agile, wild, and very difficult to tame. When irritated, it raises itself up, grinds its teeth, rubs the extremity of its beard, and leaps around the object of its revenge. In these accessions of fury, Humboldt says that he has seen it drive its teeth into thick boards of the Cediela Odorata. It drinks but rarely, and takes the water in the hollow of its hand, which it carries carefully to the mouth, so as to avoid wetting its beard. If aware that it is observed, it does not perform this singular action. Sir Rt. Ker Porter (see 'Proc. Zool. Soc.' London, 1834, p. 41), in a description of the P. Sagulata, distinctly states that the animal drinks frequently, bending down and putting its mouth to the water, apparently heedless of wetting its beard, and indifferent to the observation of lookers-on. He never saw it take the water in the hollow of the hand, as described by Humboldt. Yet that it was observed by the latter we cannot doubt; in our menageries, however, it drinks in the ordinary way of other monkeys. According to Humboldt, the Capucin de l'Orénoque does not associate in troops; a male and female in company wander by themselves through the forests, where their cry may be heard. In the vast wilds of the Upper Orinoco, south and east of the cataracts, this monkey is common, and the Aturian Indians, as well as those of Esmeralda, eat many of these animals at certain seasons of the year. In other parts of Guiana it seems to be much more rare.

The individuals which we have seen in captivity have all displayed a morose and savage temper: on the slightest provocation they would menace the offender with their teeth, wrinkling up the skin of their face and displaying their immense canines, their eyes at the same time gleaming with fury. Towards other monkeys they were reserved, and disliked to be intruded upon.

184.—THE YARKÉ, OR WHITE-HEADED SAKI

(*Pithecia leucocephala*). The male and female of this species differ so much that it is not surprising that they should have been described as distinct species. The synonyms are as follows:—MALE—P. leucocephala, Geoffr., Desm.; Saki, Buffon; Yarqué, Buff., 'Supp.'; Yarké, F. Cuv.; P. ochroce- P. rufiventer, Geoffr., Desm., Kuhl, &c.; P. rufibarbata, Kuhl.; P. capillamentosa, Spix; S. Pithecia, Linn.; Singe de nuit, Buff.; Fox-tailed Monkey, Pennant.

Male.—The whole of the anterior part of the head covered with short close hairs of a white or rusty-white tint varying in depth; occiput jet-black, whence a narrow line is continued over the head to the nose; fur of the body and tail very long, rather harsh; and of a brown colour, more or less inclined to black; under part of chin and throat naked and of an orange tint; abdomen also nearly naked; tail bushy; on the shoulders the long flowing hair has a tendency to divide.

head, excepting on the anterior part of the forehead, instead of being short, close, and stiff, are long, like those of the body, and radiate forwards and laterally. Between the eyes is a patch of short pale hairs. The fur of the body is long, of a dark or blackish brown tint, freckled paler, the hairs being annulated once or twice at the top with pale rusty-brown. In the male there is no annulation of the hairs. The scanty hairs of under parts are pale rusty-red. The long radiating hair of the head is of the same colour as that of the rest in the upper parts. In Fig. 184, which is that of the female, it is represented too pale. Till recently, the female of the present Saki has been regarded by naturalists as a distinct species. The determination of its identity with the Yarké is due to M. Schomburgk, whose opportunities of observing this monkey in its native regions of Guiana have been very abundant, and who a few years since transmitted specimens of both sexes to the Zoological Society, London, More recently he brought other specimens to England. His testimony on the point is clear and decisive.

Buffon, who figures a young male, which he terms Saki, describes the hair of the head as radiating, and of a whitish tint; whence we may suppose that till approaching maturity the males resemble the females in their "chevelure mal rangée," as he calls it, excepting as regards its colour.

The Yarké appears to live in small troops, which tenant the bushes rather than the trees of the forest, living, according to M. de la Borde, upon the fruit of the guava, and also upon bees, demolishing their combs: they also eat all kinds of grain. The female produces only a single offspring at a birth, which she carries on her back.

Genus Callithrix.—Head short and rounded: muzzle short; ears large; general form slender; tail equalling or exceeding the length of the body; not prehensile; nails, excepting on hind thumbs, long and narrow. Fur soft and delicate; canines moderate; lower incisors vertical and contiguous to the canines. Ears large, and more or less triangular.

The animals of this genus are light, active, and graceful, but so extremely delicate, that they do not endure removal from their own country without the greatest care. With the exception of the Saïmiri we have seen no living example. These little monkeys are termed Sagoins by the French: in their native regions they inhabit the depths of the forests, and are diurnal in their habits; most are gregarious; fruits, insects, eggs, and birds constitute their food, and though habitually gentle and timid, they become animated even to ferocity at the sight of living prey. The ordinary voice of these monkeys is a short reiterated note, which when they are hurt or alarmed is changed to a shrill cry.

185.—THE SAIMIRI, OR SQUIRREL MONKEY

(*Callithrix sciureus*, Desm.). Titi de l'Orénoque, Humboldt. General colour, greyish-olive; the face white, the lips and chin black; the limbs tinged with fine rufous or gold colour; the tail black at its tip; ears large and white; palms flesh-coloured; eyes large and hazel, with a pink circle round the iris; under parts of body greyish-white. Length of head and body 12½ inches; of tail 17 inches. Native country, Brazil, Cayenne, Guiana.

This slender and elegant little monkey is widely spread: it is one of the earliest of the American species with which naturalists became acquainted; and is most probably the Sapajou de Cayenne of Froger. (*See* 'Relat. du Voy. de Gennes,' 1698.) Its intelligence, its beauty, and sportiveness, render it a favourite in its own country, where it is domesticated in preference to most others of its race. It is frequently imported into Europe, but our climate is very uncongenial. Though the tail of the Saïmiri has no truly prehensile power, it is used as a sort of boa, for protection against cold; and when numbers crowd, huddled together, as they are often seen to do in the woods, they bring it between the hind legs, and twine it over the shoulders and round the neck, interlocking their arms and legs for the sake of warmth. This use of the tail we have observed in specimens in captivity.

Highly sensitive and susceptible, the Saïmiri displays its feelings by the expression of its countenance; in which pleasure, surprise, and fear, as they are experienced, are strongly depicted.

Insects, and especially spiders, are eagerly sought for and devoured by this monkey: and, as Humboldt states, it gives no little trouble to entomological travellers, who may be tempted to keep it domesticated. If it can obtain access to their store-boxes, it will devour every specimen, taking each from the pin without injury to its own fingers.

In their dense and humid forests troops of these monkeys may be seen traversing the branches in single file, the females carrying their young on their backs. The foremost leads and regulates the movements of the rest, and as he leaps from branch to branch with admirable grace and precision, all follow in succession. They ascend the "nebees," or natural ropes of creeping plants which intertwine among the trees, with great rapidity. Towards sunset they ascend to the very tops of the palm-trees, and there sleep in security. Accustomed to dense and humid forests, under a sky often covered with clouds, the Saïmiri endures with difficulty the dry and burning atmosphere of the coasts of Guiana or the adjacent districts; and it becomes melancholy and dejected in proportion as it quits the region of the forests and enters the Llanos.

our climate, though depressed by its influence, the Saïmiri is very engaging. It has a habit of gazing intently on the faces of those who notice it, a peculiarity alluded to by Humboldt, who says that it will attentively watch the motion of a person's lips in speaking, and that if it can climb on his shoulder, it will touch his teeth or tongue with its fingers.

The usual voice of this species is a low and quickly repeated whistle: but when hurt or incommoded by wet, rain, or other cause of annoyance, it utters a plaintive cry.

Genus Nocthora.—Head large; muzzle short; eyes large and nocturnal; nostrils separated by a moderate septum. Ears moderate, with an acute folded apex, the free portion being circumscribed. Nails long, narrow, and channelled; fingers of fore-hands (Fig. 186) not extensible to the full. Tail long, non-prehensile.

Humboldt proposed the term Aotus for this genus, which, by right of priority, should be retained; it is rejected, however, because its meaning (earless) involves an error.

This genus has been regarded by many naturalists as a transition form between the American monkeys and the Lemurs. It is true that, as far as general aspect and nocturnal habits are concerned, the resemblance between the Douroucouli and Lemurs is apparent; still, however, the relationship (setting ide that common to all the Quadrumana) is one of analogy, not affinity; for the Douroucouli in its dentition is more remote from the Lemurs than is the genus Pithecia, and in this point it agrees with Callithrix.

187.—THE DOUROUCOULI

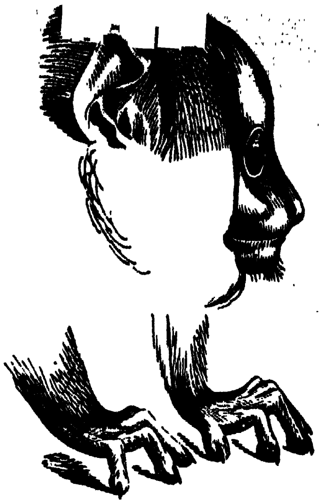
(*Nocthora trivirgata*, F. Cuv.). Pithecia miriquouina, Geoffr.; Callithrix infulatus, Lichtenst.; Nyctipithecus felinus, and vociferens, Spix.—Head round; muzzle short; eyes large, with circular pupils. General colour greyish-brown above, pale rufous below; a whitish triangular mark over each eye, bounded by an intervening mark of black ascending from the root of the nose, and another running from the angle of the mouth, passing the outer angle of the eye. Tail black at the apex. General form slender; palms flesh-coloured; face dusky; nails black. Length of head and body 13 inches; of the tail 18 inches. Native country, Guiana, Brazil.

According to Humboldt, the Douroucouli inhabits the dense forests of the Cassiquiare and Esmeralda, at the foot of Mount Duida, and the environs of the cataracts of Maypures, between the 2nd and 5th degrees of N. lat., 300 leagues from the coast of French Guiana. According to Spix it is found near Para, and in the forests of Tabatinga, on the confines of Brazil and Peru.

The Douroucouli is nocturnal in its habits, and sleeps during the day. It is greatly incommoded by light, and seeks the holes of trees or similar places for concealment. When roused it is dull and oppressed, and can scarcely open its large white eyelids. Its attitude during repose is crouching. On the approach of dusk, all the lethargy of the Douroucouli leaves it, and it becomes restless and impetuous, and roams about in quest of insects and small birds. In addition to these, various fruits, seeds, and vegetables constitute its food; but the quantit of solid aliment it consumes is comparatively little: it drinks even less, and but seldom. It glides cat-like through apertures so narrow as to appear incapable of admitting it, and its actions resemble those of viverine animals. Its beautiful glossy fur is in great request, the natives make tobacco-pouches and other articles of it, which they sell. A male and female are often taken together in the same hole asleep; for the Douroucouli lives not in troops, but in pairs, and is strictly monogamous. The nocturnal cry of this animal is extremely loud and sonorous, and resembles that of the Jaguar: besides this, it utters a mewing noise like that of a cat, and also a deep, harsh, guttural note, represented by the syllables *quer*, *quer*. When irritated, its throat becomes distended; and in the posture then assumed, and in the puffed state of the fur, it resembles a cat attacked by a dog.

In 1833 a young male lived for a short time in the menagerie of the Zool. Soc, London. Its aspect and movements were very lemurine; its large eyes, which it opened when the dusk of evening came on, were brilliant, and gave an animated expression to its countenance not exhibited during the day, when it rested crouching on its perch, lethargic and motionless. It lived chiefly upon bread sopped in milk, refusing meat, either dressed or raw.

183.—Couxio.

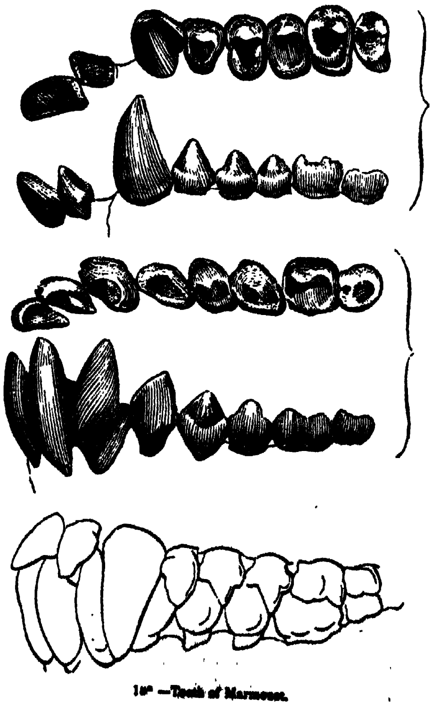

186.—Profile and Feet of Douroucouli.

185.—Saimiri.

190.—Marmoset.

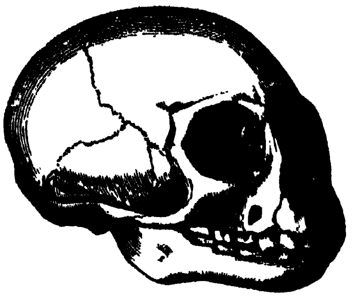
182.—Couxio.

187.—Douroucouli.


188.—Teeth of Marmoset.

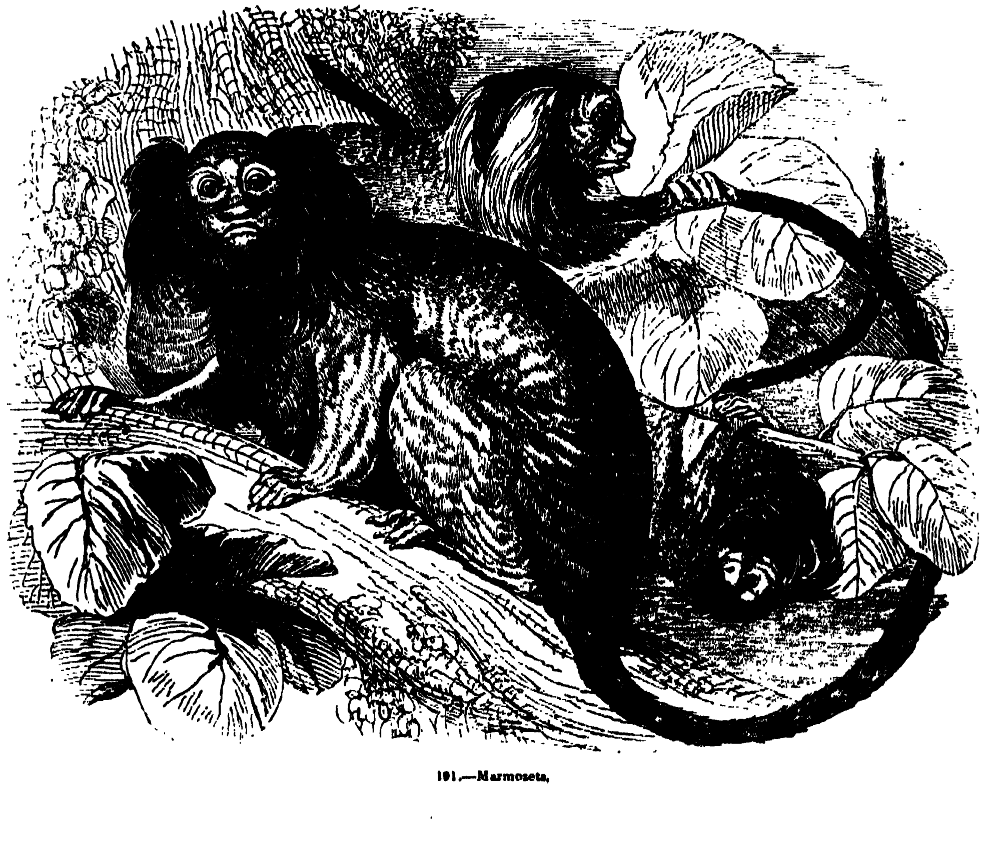
189.—Marmoset.

192.—Marikina.



193.—Skull of the Monkey.

197.— White-fronted Lemur.



191.—Marmosets.

196.—Ruffed Lemur.

199.—White-fronted Lemur.

Genus Hapale, Illiger (Jacchus and Midas, Geoff.; Saguinus, in part, of Lacépède). The Marmozets, or Ouistitis, as the monkeys of this genus are termed, are distinguished from the rest of the American groups by some peculiarities in their dentition.

Dental formula:—incisors, $\frac{4}{4}$; canines, $\frac{1-1}{1-1}$; false molars, $\frac{3-3}{3-3}$; true molars, $\frac{2-2}{2-2}=32$. (Fig. 188.) Of the incisors of the upper jaw the two middle are the largest; those of the lower jaw equal the lower canines in length: the tubercles of the molars are acute. The muzzle is short; the nose is salient, with nostrils widely separate; the limbs are short; the fingers slender, and all, excepting the hind thumbs, which are remarkably short, are furnished with sharp, long, compressed, hooked claws, like those of a squirrel. The fur is full and soft; the tail longer than the head and body, and generally bushy. General contour, stature, and actions, squirrel-like. The Marmozets, or Ouistitis (so called from their sharp whistling cry), are diurnal in their habits; they are irritable in their temper, but timid, and by no means remarkable for intelligence. The most prominent feature in their disposition seems to be extreme caution, an instinctive quality necessary to their preservation; for though nimble and quick, they are subject to the assaults of the smaller beasts of prey, and of hawks and snakes. Still they are not cowardly, and will defend themselves with great spirit against the attacks of an enemy far stronger than themselves. Linnæus, in his account of the Common Marmozet, states that it displays great hatred towards cats, and attacks them with ferocity, an observation founded most probably on a single example which came under his immediate notice.

None of the American monkeys are more sensitive of cold than the Marmozets, and nature has well provided for their comfort; not only is the fur deep, soft, and warm, but the long, full tail is twisted, as in the Saïmiri, round the body, which, during their noctural repose in some hollow tree, is gathered up into as small a space as possible, and in this crouching attitude they resemble a ball of fur with a little face projecting from it.

These animals are easily rendered tame, and their elegant figure—their soft silky fur coloured with blending tints—their nimbleness and diminutive size, have contributed to render them favourites in their native climate as well as in other parts of the world. From observations made upon the Marmozets in captivity, it appears that they are more prolific than other monkeys, producing two or even three young ones at a birth. In their native regions, viz., the deep forests of Para, Guiana, and Brazil, they associate in small families, and feed upon various fruits and insects, devouring the latter with great eagerness.

189, 190, 191.—The Common Marmozet

(*Hapale Jacchus*). Ouistiti, Buffon; Sanglin, Edwards; Jacchus vulgaris, Geoffr.; Simia Jacchus, Linn. Fur long and soft, variegated black, white, and rusty yellow, the black and white forming alternate undulations. Ears surrounded by a large plume of erect hairs, white, sometimes tipped with dusky black, and sometimes perhaps largely washed with black, if not quite black. Head and throat dusky black: a white frontal mark above the root of the nose. Tail annulated, dusky black and white. Native country, Brazil, Guiana.

Little has been recorded respecting the natural habits of this beautiful animal, beyond the facts of it congregating in small families, of being active and shy, and of its subsisting upon insects and eggs, together with fruits, such as bananas and mangoes, of which it is very fond.

It is frequently brought to Europe, and has not only lived several years, but produced young in the menageries of France and England. Distrustful, especially towards those whom it is not accustomed to see, it retires from observation, and on being touched utters its peculiar whistling cry, or becomes angry and resists the unwelcome attempt to court its confidence. When undisturbed it displays much liveliness, and exerts its activity, leaping from perch to perch, with squirrel-like address, and in all its actions justifying the expression of "nimble marmozet," used by Shakspere.

Extremely sensitive to cold, no little of the Marmozet's time is passed in protecting itself against the changes of temperature to which our atmosphere is subject. All the wool, cotton, or other soft materials with which it is furnished, it will carry to some convenient corner of its cage, or to an inner dormitory, and there completely bury itself in the downy mass, from which it will peep out on a person's approach, but from which, unless induced by the offer of tempting food, it can seldom be induced to emerge altogether. When two or three are confined in the same cage, they huddle themselves together, and lie nestled in their bed.

The Marmozet eats bread, fruits, and finely-minced meat: it feeds in a crouching attitude, and usually holds everything between its two fore-paws, the long hooked nails assisting it. Edwards, in his 'Gleanings,' speaking of one of these animals which came under his own observation, informs us that it fed upon various articles of diet, as biscuits, fruits, pulse, insects, and snails; and that, being one day at liberty, it darted upon a small gold-fish which was in a bowl, killed it, and greedily devoured it. After this occurrence, some small eels were offered to it, which at first frightened it by twisting round its neck, but it soon overcame and eat them.

In the first number of the 'Magazine of Natural History' (1822), an interesting account is given, by Mr. Neill, of the manners of one of these monkeys, which he purchased at Bahia, the capital of the province of St. Salvador, Brazil. At first, as he states, it displayed great wildness and even fierceness, screeching most vehemently when any one offered to approach it, and it was a long time before it was so reconciled even to those who fed it as to allow the slightest liberty in the way of touching or patting its body; it was impossible to do this by surprise, or by the most stealthy and cautious approach, as the creature was not still for a moment, but was continually turning its head from side to side, eyeing every person with the most suspicious and angry look; and its sense of hearing was so exceedingly acute, that the slightest noise, or even a whisper, was sure to rouse it. Its diet consisted of fruits, such as bananas, mangoes, and Indian corn, but when during the voyage these failed, it eagerly fell upon the cockroaches, of which it effectually cleared the vessel. It would frequently eat a score of the larger kind, which are two inches and a half long, and a great number of the smaller ones, three or four times in the course of the day. It was quite amusing to see the Marmozet at its meal. When it got hold of one of the large cockroaches, it held the insect in its fore-paws, and then invariably nipped the head off first: it then pulled out the viscera and cast them aside, and devoured the rest of the body, rejecting the dry elytra (wing-cases) and wings, and also the legs of the insect, which are covered with short, stiff bristles. The small cockroaches it ate without such fastidious nicety. In addition to these insects, milk, sugar, raisins, and crumbs of bread were given to it. From London it was conveyed to Edinburgh, where it was living, when Mr. Neill wrote his account, in perfect health: there, contrary to the statement of Linnæus, who says that it is an enemy to cats, it made acquaintance with one, with which it fed and slept, and lived on the best terms imaginable. Though it became gradually tamer, it never lost its original wildness and distrust.

The first account of the Marmozet having bred in Europe is given by Edwards ('Gleanings'), who received it from a lady living at Lisbon, a pair of these animals, during her residence there, having produced young. They were at first ugly, and almost destitute of fur and clung to the breasts of the mother; but as they grew larger, they mounted her shoulders and back: when tired with carrying them, she would detach them from her by rubbing them against a wall or anything in her way: the male would then take charge of them, till she was inclined to resume her duties.

In the year 1819, three young ones, a male and two females, were produced in the Menagerie of Paris. Their colour was of a uniform deep grey; the tail was almost destitute of hair; and they were born with their eyes open. M. F. Cuvier, in describing their domestic economy, confirms the account given by Edwards; but confinement, in this instance, so far destroyed the admirable instinct, common even to the most savage animals, that one of the little ones was killed by its mother before it had an opportunity of asserting the strongest claim to her affection; and the other two, which she eagerly cherished the moment they commenced deriving their nutriment from the natural fountain of life, were deserted by both parents when the supply from that source, probably from improper nourishment, prematurely ceased. During the short time they existed, the task of nursing them almost wholly devolved upon the male parent, which, at first, most assiduously cherished them, placing them, when they claimed his protection, either under him or upon his back, and thus carrying them about. The female avoided, as much as possible, the troublesome charge, receiving them unwillingly from her partner; and the moment she had supplied them with nourishment, again forcing them upon his attention, at the same time uttering a peculiar cry, as if asking him to ease her of a burthen with which she was intolerably fatigued.

In 1832 a pair bred in the Gardens of the Zoological Society, at the Regent's Park, London, and produced twins, which, however, died. Other examples are also upon record.

192.—The Marikina, or Silky Tamarin

(*Hapale rosalia*). Midas rosalia, Geoff. The Marikina is one of the species of the present group, which M. Geoffroy has separated, upon not very tangible grounds, into a genus termed Midas. Fur long, silky, and of a glossy golden yellow; hairs of the head long and falling, parted down the middle of the crown by a line of short rust-brown hairs; ears concealed by the long hair of the head; tail almost tufted at the apex. Native country, Guiana, Brazil.

This species is subject to considerable variation in the richness of its colouring: we have seen specimens of a straw-yellow, with a silvery lustre.

Two or three opportunities have been afforded us of observing this beautiful species in captivity. Judging from these individuals, this animal is more confiding and less irritable than the common marmozet, which, however, it resembles in its actions. When alarmed or angry, it utters a shrill cry, and slightly raises the long hairs around the sides of its face, displaying its teeth, as if threatening to bite. Contrary to Buffon's opinion, who considers it to be more hardy than most of its congeners, it appears to be full as susceptible of the changes of our climate, and indeed dies immediately if exposed to damp or wet.

In this opinion Fred. Cuvier fully coincides. These animals, he observes, are natives of Brazil, and from the delicacy of their constitution they cannot be kept alive in France without the greatest care to preserve them from the influence of atmospheric changes, and especially from the cold and humidity of the winter season: under the depressing effects of wet and chilly weather, they lose all their sprightliness, droop, and die. Speaking of the individual figured in his splendid work, and which was brought, in 1818, from Brazil to Paris, where it lived for a short time in the Menagerie of the Jardin de Plantes, he states that it was very active and lively, and, like a bird, preferred the topmost perches of the cage. On the least alarm it always concealed itself; and though it appeared gratified with the notice and caresses of those whom it knew, and came to them when called, it never returned any expressions or signs of attachment as other monkeys do when noticed by persons to whom they are attached. It disliked strangers and retired from them, regarding them with looks of defiance, and menacing with its feeble teeth. Fear or anger it expressed by a short, sharp, whistling cry, but sometimes, as if from ennui, it raised its voice into a louder or more prolonged note. In these details the individuals described by Fred. Cuvier resembled the specimens which have lived in the vivarium of the Zool. Soc. Lond. The interest which attached to them resulted only from the lustre of their silky fur and from the elegance of their actions, for it was evident that their intelligence was very circumscribed. That prying curiosity, always amusing, sometimes troublesome, which monkeys in general exhibit, appeared to form no part of their character, and the confidence they manifested towards those accustomed to feed them was unmixed with tokens of attachment or gratitude. Still it is difficult to form a correct idea of the character of animals from individuals in confinement; and it cannot be doubted that in its native forests, of which it is one of the ornaments, the Marikina, like the squirrel of our woods, displays habits and manners calculated to excite the interest of the observer. Of these, however, nothing is definitely known. According to Prince Maximilian, the Marikina is more rarely found in Brazil than in Guiana.

LEMURS

(*Lemuridæ*). The Lemurs (Les Makis of the French) differ from the monkeys of both worlds in dental characters, but in quadrumanous structure they approach those of the old, having opposable thumbs on the fore-hands as well as on the hinder pair. The contour of their body is very peculiar: the general form is slender and elongated, the head is pointed and somewhat fox-like; the nostrils have a sinuous opening, terminating a sharp, naked, and somewhat prominent muzzle; the eyes are large and of a nocturnal character; the limbs are long, especially the hinder pair, which in some species greatly exceed the anterior; the fore-hands have a true thumb, but in some species the index-finger is abbreviated; the thumb of the hinder hands is large, and greatly expanded at the tip; the index-finger of these hinder pair (and in the Tarsier, the next also) is armed with a long, subulate, slightly curved claw; the other nails are flat; the fur is full and woolly; the tail varies, it is never prehensile, and is sometimes wanting: habits pre-eminently arboreal. If we compare the skull of the monkey (193) with that of the ordinary Lemurs (194), we shall observe many distinctions. The volume of the Lemur's skull, taken in relationship to that of the face, is greatly diminished; no trace of a forehead remains, but the frontal bone falls so completely back behind the developed and projecting facial portion of muzzle, as to present an almost level surface along the nasal bones to the top of the head. The occipital condyles have the same posteroir situation as in the dog, so that the head is suspended from, rather than even partially balanced on, the vertebral column. The orbits are not completely walled within, but open into the temporal fossæ, and have an obliquely lateral aspect; the nasal bones run the whole length to the tip of the snout, or nearly so; the lower jaw is long and narrow, and consists of two rami perfectly separate at the chin. Here indeed we first meet with the symphysis of the lower jaw unobliterated, even in the most advanced period of life. In man and the monkeys this suture is not apparent, even in the youngest subjects; but in the lower mammalia, excepting in the Pachydermata, as a general rule, it is always present. The teeth are as follows:—Four small incisors above in pairs, with an intermediate space between them for the reception of the points of the lower incisors and lower canine teeth. The lower incisors (in the true Lemurs) are four in number, but they are accompanied by the lower canines, which, except that they are stronger and larger, resemble the incisors in form and direction. They are long, pointed, compressed, in close contact with each other, and directly obliquely forwards. The canines of the upper jaw are compressed, pointed, and sharp on their posterior edge. The molars are crowned with sharp angular tubercles.

Dental formula of the genus Lemur (Fig. 194*):—Incisors, $\frac{4}{4}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{6-6}{6-6}$. The first false molar below is stout, and resembles a canine, whence has arisen the idea that it is so really, and that the lower incisors were 6 instead of 4.

Genus Lemur. Head long, muzzle pointed, eyes moderate and oblique; ears short and hairy; tail long and bushy; mammæ two, pectoral. All are natives of Madagascar, arboreal, nocturnal. Their movements are light, sweeping, elegant, and precise. Their usual voice is a low inward grunt, but they often break forth into an abrupt hoarse roar, producing a startling effect. The term Lemur (from the Latin *Lemures*, Ghosts) was first adopted by Linnæus in allusion to the nocturnal habits and stilly sweeping movements of these singular animals.

195, 196.—The Ruffed Lemur

(*Lemur Macaco*) Le Vari, Buffon. This is one of the largest and most beautiful of the genus, exceeding a cat in size. Its fur is of admirable texture, being full, fine, and silky; the tail is long and bushy. The general ground is pure white, on which large black patches are tastefully arranged; the tail is black; a full ruff of longer hairs than those of the body surrounds the face; whence its English appellation.

Of the native habits of this and the other Lemurs in the deep forests of Madagascar little is known: they avoid the presence of man, and though harmless, will defend themselves with great resolution, inflicting severe wounds with their sharp canines. They associate together in troops, and after sunset their hoarse loud roar may be heard in dissonant chorus, resounding among the recesses of the woodland wilderness. The roar of the Ruffed Lemur is peculiarly deep and sonorous. During the day the Lemurs sleep in their retreats. Fruits, insects, reptiles, small birds, and eggs constitute their food

When taken young, these animals soon become familiar, and are fond of being noticed and caressed, exhibiting considerable attachment to those who attend them: but we have known them bite severely persons who have irritated them.

In captivity, with due care, they bear our climate well, though they are impatient of cold, as might be inferred from their soft thick fur. They are fond of sitting perched on the fender before a fire, and in this situation they will spread their hands, half close their eyes, and testify unequivocal satisfaction. During the day they sleep in a ball-like figure on their perch; and if two be in a cage together they sit close to one another with their tails wrapped boa-like round each other's body, so as to make one round ball, from which, on being disturbed, two heads suddenly make their appearance. Though less intelligent than monkeys in general, they are more gentle and confiding: they will put their heads to the bars of their cage, to have them scratched and rubbed, and by their actions invite notice. They have little of the prying, mischievous, petulant disposition of monkeys, so that with due precaution they may be trusted in a room at liberty. When presented with food, they usually take it in their hands; but we have seen them feed upon soft bread without holding it. They lap fluid like a dog. They bound and leap with the most astonishing agility, gracefulness, and address; and when in motion the tail is elevated in a sigmoid form, and not trailed after them. Strong light greatly incommodes them; their eyes gleam at night; and the pupil is transverse, dilating with the advance of evening dimness.

197, 198.—The White-fronted Lemur

(*Lemur albifrons*). Fur ruddy or bronzed-grey above: male with the forehead and sides of the face white; female with the same part of a deep grey. The female and the Lemur Anjuanensis (Maki d'Angouan) are distinct, contrary to the opinion of Lesson.

The White fronted Lemur is gentle, affectionate, and lively: it leaps with great agility, and after a spring of many yards, pitches so lightly on its fingers as hardly to attract the notice of the ear. Its manners are the same as those of its race in general.

199.—The Flocky Lemur.

Maki à Bourre of Sonnerat; Lemur Langier, Lichanotus Laniger, Indris Laniger. This species, which was first described and figured by Sonnerat, as the Maki à Bourre, has been, we know not why, regarded as a species of Indris (Lichanotus, Illiger), and placed in that genus Cuvier doubted its alliance to that group; and for ourselves we hesitate not in referring it to the genus Chirogaleus, Geoffr., founded for the reception of certain Lemurs described and figured by Commerson, but till lately unknown to European naturalists.

The fingers of both fore and hind hands are furnished with long pointed claws, the thumbs only having flat nails.

The Flocky Lemur is about a foot in the length of the head and body, the tail being nine inches long. The colour is pale ferruginous above, white beneath; the fur is extremely soft and curled, deepest about the loins. Face black, eyes large and greenish-grey.

In the museum at Paris we examined a species of Chirogaleus closely allied to (perhaps identical with) the Flocky Lemur: it was labelled Chirogaleus Milii. Head broad and flat; ears moderate and hairy. Fur soft, full, curly, and glossy, of a fine fawn-brown, paler between the eyes, which are large and surrounded by a brown disk. The hairs are all lead-coloured at the base: chin, throat, under surface, and inside of limbs white. Tail fawn-brown. Teeth as in the genus Lemur. Nails minute, flat, but sharp-pointed; those of the thumbs as usual Length of head and body about 14 inches; of the tail 12 Of two specimens one was presented to the museum by M. Goudot, the other, alive, by M. le Baron Milius. Native country, Madagascar.

200.—The Short tailed Indris

(*Lichanotus brevicaudatus*). L'Indri, Sonnerat? Indris brevicaudatus, Geoffr. The genus Lichanotus (or Indris) differs in some details of dentition from the genus Lemur, to which in most points it is closely allied. The following description of the Indris was taken from a fine specimen in the Paris Museum. The anterior part of the face nearly naked; the forehead, temples, throat, and chest white; the ears, the occiput, shoulders, arms, and hands black. The lower part of the back brown, which colour divides on the haunch into two lines, which run down the buttocks and spread on the thighs, leaving the crupper, tail, and posterior part of the thighs white; the root of the tail is tinged with yellow Anterior part of thighs and feet deepening into black; heels white, with an anklet of greyish-white; breast brown Flanks and lower part of belly white; and also the inside of the arms Fur beautifully soft and woolly. Thumbs very large and powerful; foretoe small and united to the next, almost to the last joint: it is armed with a long sharp nail. The nails of the thumbs and fingers, and also of the toes, the first excepted, are small, flat, subkeeled, and pointed Length from muzzle to root of tail two feet; of the tail three inches; of the hind feet seven inches and a half.

The Indris is a native of Madagascar, where it is said to be frequently trained by the natives for the chase. Its voice resembles the wailing cry of a child. The word Indris is said to signify in the Madagascar language a "man of the woods."

201.—The Diadem Lemur

(*Propithecus Diadema*, Benn.). Mr Bennett proposed the genus Propithecus for this Lemur, which is a native of Madagascar, and which appears to us, notwithstanding the length of the tail, to belong in reality to the genus Lichanotus. It is in fact a long-tailed Indris. Of its habits nothing is known.

Description:—Face nearly naked, with short blackish hairs about the lips, and equally short yellowish-white hairs in front of the eyes. Above the eyes, the long, silky, waved, and thickly-set hairs which cover the body commence by a band of yellowish white crossing the front and passing beneath the ears to the throat. This is succeeded by black, extending over the back of the head and neck, but becoming freely intermingled with white on the shoulders and sides, the white gradually increasing backwards, so as to render the loins only slightly grizzled with black. At the root of the tail fulvous, that colour gradually disappearing until the extreme half of the tail is white with a tinge of yellow. Outer side of the anterior limbs, at the upper part, of the slaty-grey of the sides, below which it is pale fulvous. Hands black, except tufts of long fulvous hair at the extremities of the thumb and fingers, extending beyond and covering the nails. Outer sides of the hinder limbs, after receiving a tinge of fulvous from the colour surrounding the root of the tail, of a paler fulvous than the anterior limbs: this becomes much deeper on the hands, which are fulvous, except on the fingers, where there is a very considerable intermixture of black, the terminal tufts, equally long with those of the anterior hands, being, as in them, fulvous. The under surface white throughout, except the hinder part of the throat, where it is of the same colour with the sides of the body.

Hairs generally long, silky, waved, erect, and glossy; shorter and more dense on the crupper, where they offer a sort of woolly resistance. General character of those on the tail, that of the body hair, but shorter.

Thumb of anterior hands slender, placed far back, and extremely free, thumb of hinder hands very strong.

Length of body and head, measured in a straight line, one foot nine inches, of the tail, one foot five inches. Anterior limbs, exclusive of hands, seven and a half inches in length from the body; posterior limbs, fifteen inches and a half.

Muzzle shorter than in the Lemurs generally; the distance from the anterior angle of the orbit to the tip of the nose (one inch and a quarter) being equal to that between the eyes Ears rounded, concealed in the fur: length one inch, breadth one inch and a half.

In a young specimen which we examined at Paris the yellow tint on the limbs was very bright and golden.

Genus Stenops (Loris and Nycticebus, Geoffr.). In the genus Stenops the dentition is the same as in the Lemur, but the tubercles on the crowns of the molars are more acute The animals of this group are termed Loris, or Slow Lemurs. They are characterised by the head being round, the muzzle short and acutely pointed; the eyes large, full, bright, and approximating to each other: the ears short, round, open, and almost buried in the fur; the tail completely rudimentary, and the limbs slender. Two species are known, both natives of India and its islands, especially Ceylon, Java, Sumatra, &c.

These animals have been long celebrated for the slowness and caution of their movements, to which may be added a remarkable tenacity of grasp, in conjunction with the power in the limbs of exerting a long continuance of muscular contraction. In the arteries both of the anterior and posterior extremities there is a peculiarity first detected by Sir A Carlisle, and met with in the limbs of the Sloth and a few other instances No sooner has the main artery, a single tube, reached the commencement of the limbs, but it assumes another character: instead of continuing its course as a simple tube, giving off branches as it proceeds, the usual mode, it becomes suddenly subdivided into a congeries of small tubes intertwined together, and communicating with each other freely, thus forming an elongated plexus, which may act as a sort of reservoir and carry onwards a large volume of blood. The relation of this plexus to the bulk of the limb it supplies with blood is greater in point of volume than that of the simple artery in ordinary animals.

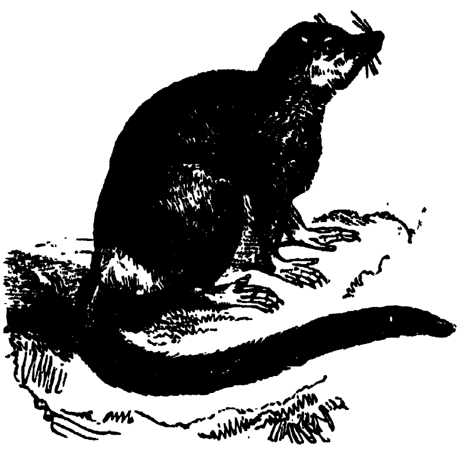
202.—The Slow-paced Loris

(*Stenops tardigradus*). Fur soft, and full; colour brownish grey, a deep chestnut stripe passing down the middle of the back; this stripe, continued on to the head, gives off a branch which encloses each ear, and another which encircles each eye, and extends to the angles of the mouth; figure short, hind limbs longer than the fore limbs. Eyes large, nocturnal, with transverse pupils, muzzle short and pointed. Length 12 or 13 inches.

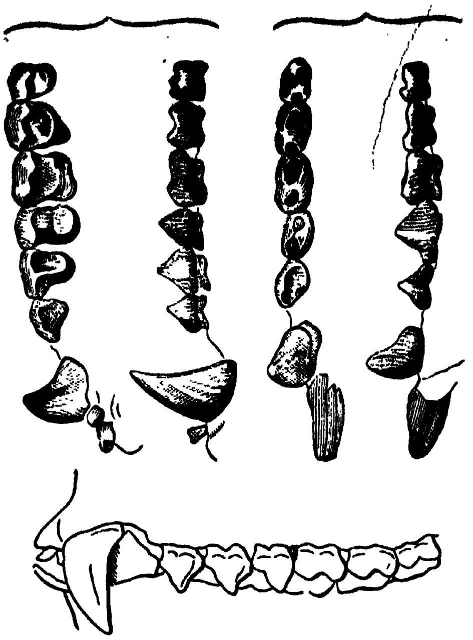
203, 204.—The Slender Loris

(*Stenops gracilis*). Muzzle produced, slender acute; figure slight; limbs very long, thin, and meagre. General colour rufous-grey; the under parts whitish; space round the eyes dusky, fur soft; a whitish or white frontal spot points to the interval between the eyes. Length of head and body nine inches.

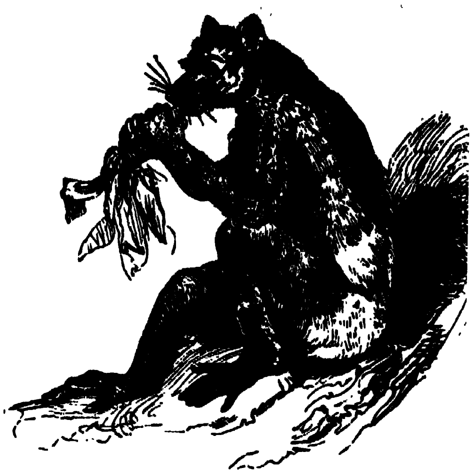
These two singular animals are eminently nocturnal and arboreal. they sleep during the day on their perch, in a crouching attitude, with the body drawn together, and the head doubled down upon the chest. At night they prowl among the forest



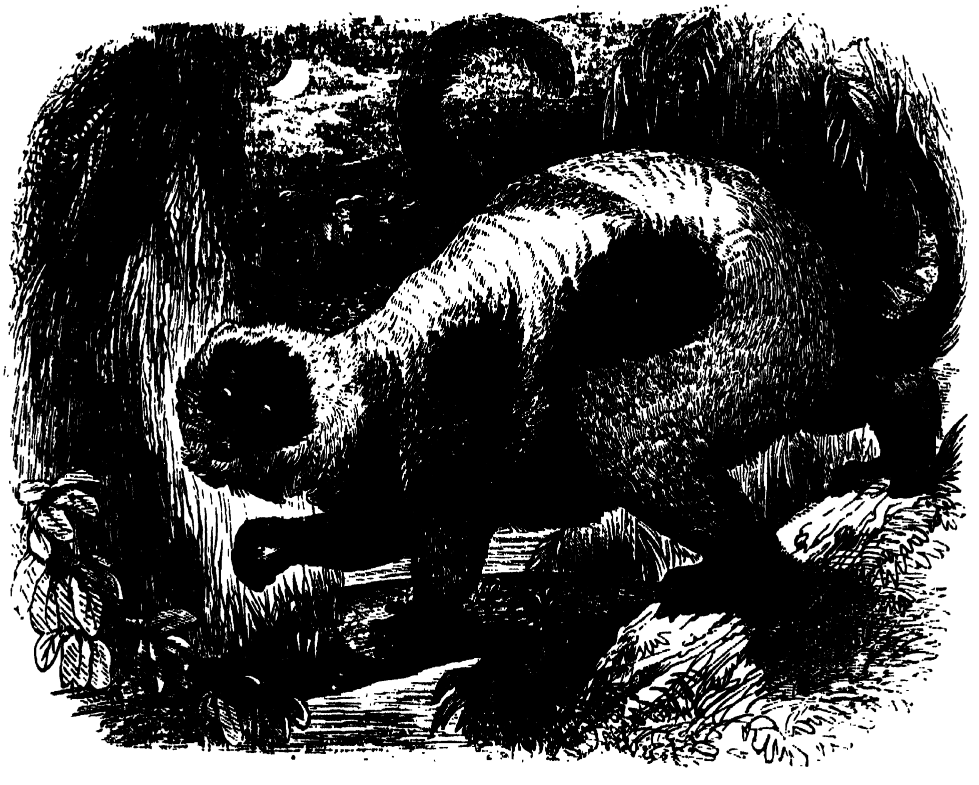
199.—Flocky Lemur.



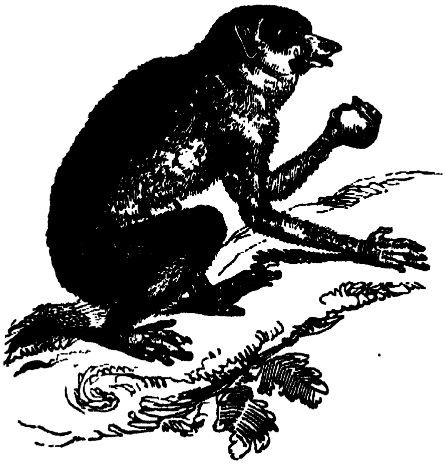
194*.—Teeth of Lemur.



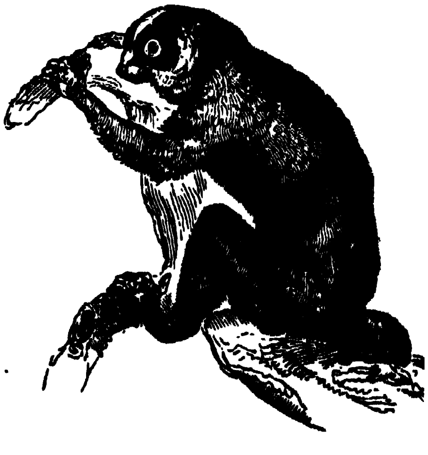
200.—Short tailed Indris.



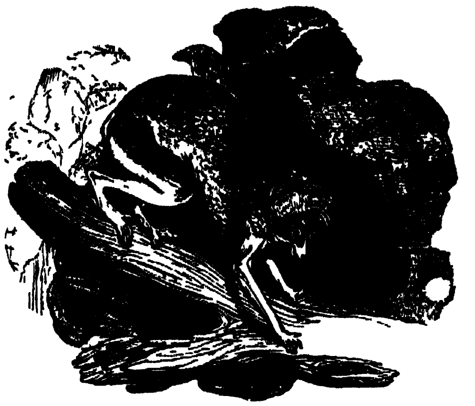
196.—Ruffed Lemur.



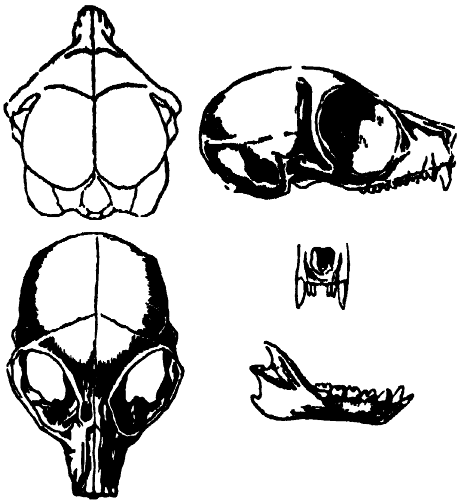
203.—Slender Loris.



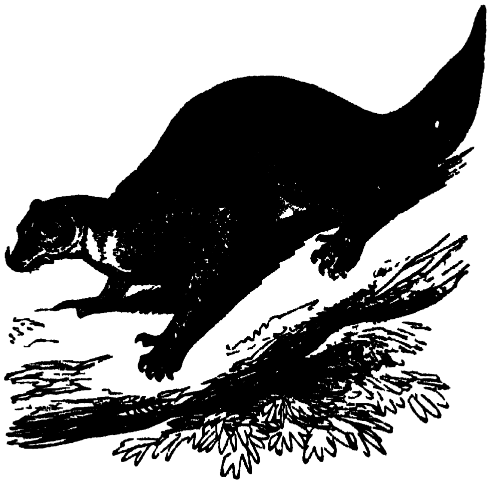
202.—Slow-paced Loris



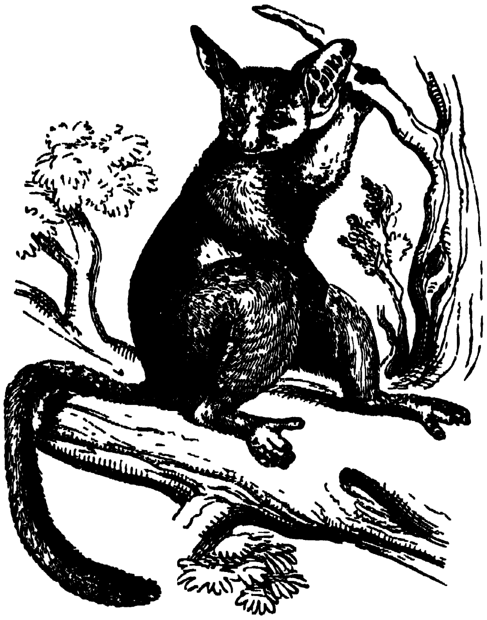
204.—Slender Loris.



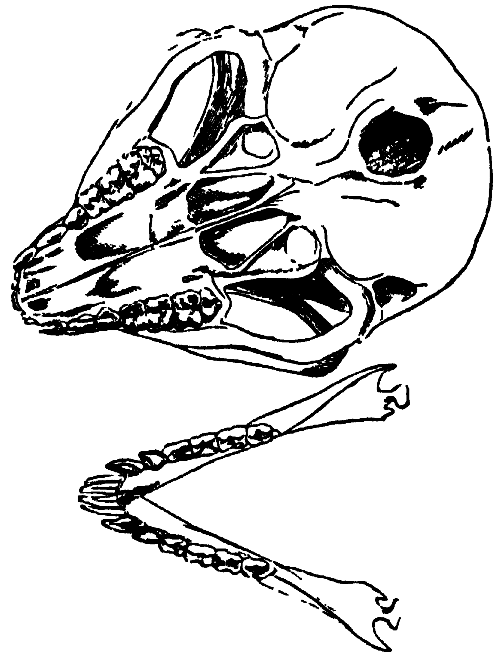
207.—Skull of Moholi.



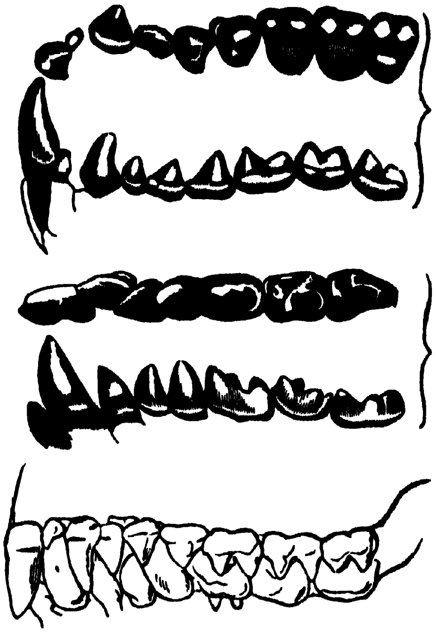
212.—Colugo.



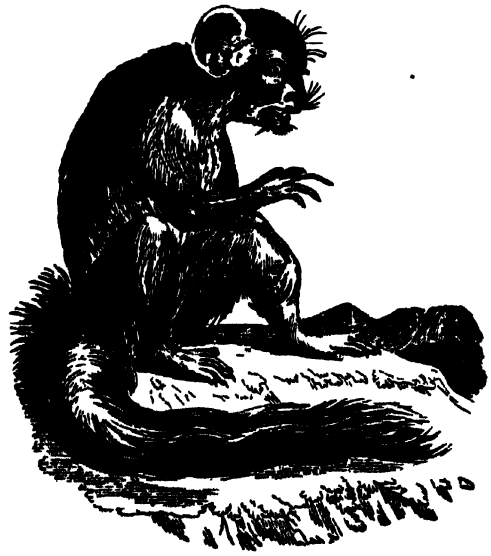
206.—Moholi



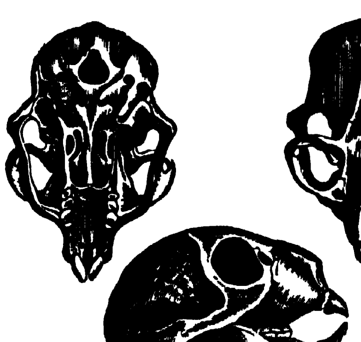
208.—Base of Skull of Moholi and Lower Jaw, natural size.



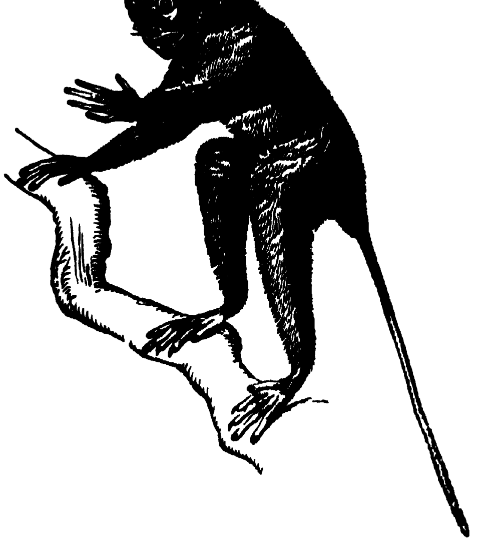
205.—Teeth of Tarsiers



210.—Aye-Aye.



112—Skull of Aye-Aye.



209.—Banca Tarsier.

boughs in search of food; their large glaring eyes now glow with peculiar lustre; not an insect, not a bird escapes their scrutiny: they mark their victim; stilly, and imperceptibly as the minute-finger traverses the dial-plate, do they advance upon their prey; and not less surely does the minute-finger attain a given mark than they their prey: when it is once within range of their grasp, they seize it by a rapid instantaneous action. Besides birds, insects, and eggs, fruits also form part of their diet.

Of all the Lemuridæ which we have seen alive, none appear to be so susceptible of cold or so incommoded by daylight, nor are any so apparently dull and inanimate from morning till evening. They appear as if in a state of continual torpor; yet if exposed to the influence of warmth, they will rouse up, not only on the approach of twilight, but even during the hours of day, if shielded from the glare of the sun. When fairly awake, and comfortably warm, they delight to clean and lick their full soft fur, and will allow themselves to be caressed by those accustomed to feed them.

Mr. Baird, in an interesting paper in the 'Magazine of Nat. Hist.' vol. i., 1829, remarks that all the known Mammalia close their eyelids in a direction upwards and downwards, and, in general, the upper eyelid is the one possessing the greatest degree of motion. He found, however, that in his slow-paced Lemur the eyelids were brought together in a diagonal direction, or outwards and inwards, which gave the animal at the moment of shutting its eyes a most peculiar look. It was the under or outer eyelid that had the greatest degree of motion, the upper or inner one being almost fixed; and he concludes that the orbicularis oculi must be very powerful. After the death of the animal, and when Mr. Baird had left this country on a second voyage to India, the eye was dissected by Dr. Knox, who found that the peculiar movement of the eyelids above described did not depend on any peculiar structure, but merely on the greater degree of strength of the orbicularis muscle.

Mr. Baird also observed another peculiarity in the species. "Beneath the tongue proper," says he, "if I may so call it, which is somewhat like that of the cat, though not rough, is another tongue, white-coloured, narrow, and very sharp-pointed, which he projects along with the other one when he eats or drinks, though he has the power of retaining it within his mouth at pleasure." Mr. Baird, however, had not been able to see any particular purpose to which he applied it; but he saw him use this double tongue when eating flies, of which he was exceedingly fond, snapping them up most eagerly when presented to him, and catching them himself when they were reposing in the evening upon the walls of the room.

Pennant, Vosmaër, Sir W. Jones, Mr. Baird, M. d'Obsonville, and others have published detailed observations made upon Loris in captivity, and their accounts coincide with the facts which have come under our own notice.

Vosmaër's specimen (S. tardigradus) ate fruits, such as pears and cherries, with relish; and also dry bread and biscuit; but if dipped in water, would touch neither. When offered water, it smelt it, but drank not. Eggs were favourite diet. "Il aimait à la fureur les œufs," are the words of Vosmaër, who, concluding from its appetite for eggs that it would eat birds, gave it a live sparrow, which it instantly killed with a bite, and ate the whole very greedily. He gave it a live cockchafer, to try whether it would eat insects: it took the offering in its paw, and devoured it completely. Vosmaër afterwards gave it a chaffinch (pinçon), which it ate with much relish, and afterwards slept for the remainder of the day. He often saw it still awake at two hours past midnight; but from half-past six in the morning its sleep was so sound, that its cage might be cleaned without disturbance to its repose. If forcibly awakened during the day in order to teaze it, it was vexed, and bit the stick; but with a very slow motion, repeating the cry Ai, ai, ai, drawing out the ai each time into a plaintive, languid, and trembling note, in the same manner as is reported of the American sloths. When it was thus harassed for a long time, and thoroughly roused, it crawled two or three times round its cage, and then slept again. Mr. Baird informs us that he obtained his specimen at Pulo-Penang (Prince of Wales' Island); and at the time he wrote, it had been nearly ten months in his possession. Its food consisted of fruit and small animals, such as birds and mice. The plantain was the fruit of which it was most fond, and was the only food Mr. Baird saw it eat when he first got it into his possession. The necks of fresh-killed fowls formed the major part of its sustenance during the voyage. It was particularly fond of small birds: these, when put into the cage, it killed speedily, and, stripping off the feathers, soon devoured them, eating the bones as well as the flesh. Veal was preferred to all other butcher's meat, and it was fond of eggs: meat boiled, or otherwise cooked, it would not touch. Sugar appeared to be grateful to its palate, and it ate gum-arabic. The juice of oranges was also greatly relished, and, unlike Vosmaër's specimen, it readily fed upon bread sopped in water and sprinkled with sugar; and lapped water eagerly like a cat.

Genus Tarsius. The Tarsiers, of which two species are known, are distinguished by the rounded figure of the head, and the extreme shortness of the muzzle; by the enormous size of the eyes; and the extraordinary length and slenderness of the hinder limbs, of which the tarsus is thrice as long as the metatarsus. The fingers both of the anterior and posterior limbs are elongated and slender; the hind thumb is well developed, with a small triangular nail, and the first and second fingers are furnished with small, pointed, narrow claws. The ears are large, naked, and capable of being folded. Tail long, covered with short hair. The first description of the Tarsier (T. Spectrum) is due to Daubenton, who gave it this title, in allusion to the length of the tarsi. Gmelin, misled by its apparently anomalous structure, placed it in his genus Didelphis (the receptacle alike of opossums and kangaroos), under the name of D. macrotarsus. Pennant, misled by the tarsi, termed it the Woolly Gerboa. M. F. Cuvier considers its dentition to approximate to that of some of the bats.

Dental formula (Fig. 205):—Incisors, $\frac{4}{2}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{6-6}{6-6}=34$.

In their habits the Tarsiers are arboreal and decidedly nocturnal, preying on birds, eggs, insects, &c.: one species is a native of the Moluccas, the other of the island of Banca.

206.—The Moholi (Galago Moholi).

We select as an example of the genus Galago (Otolicnus, Ill)., the Moholi of Southern Africa. The Galagos, though they approach the Lemurs in the dental characters, differ from those animals in many well-marked and important points. The ears are large, membranous, naked, and, as in the long-eared bats, capable of being folded down over the external orifice. The posterior limbs are greatly developed, and especially at the tarsal portion. The eyes are large and full; the head is round; the muzzle pointed; the tail long; the fingers both of the fore and hind hands, long and slender. with the usual sharp claw on the first finger of the hinder pair. The fur is full, soft, and woolly. The skull (Figs. 207, 208) is more globular, and with larger orbits than we find in the Lemurs: it is more elevated above, and broader.

The Galagos are nocturnal animals: during the day they sleep on the branches, their ears being folded down: on the approach of night they are all animation, and, with ears expanded and glistening eyes, they begin their prowl for food. They watch the insects flitting among the leaves: they listen to the buzzing of their wings amidst the foliage, and dart upon the incautious flutterer with great activity. In addition to insects, they feed on fruits and gum; and one species is abundant in certain gum-forests in the great desert of Sahara.

The Moholi was found by Dr. Smith, close to the Limpopo river, in about 25° S. lat. He observed these animals springing from branch to branch, and from tree to tree, with extraordinary facility. In their manner they considerably resembled the monkeys, particularly in grimaces and gesticulations. According to the natives, the species is entirely nocturnal, and rarely to be seen during the day, which the animal spends in the nest which it has formed in the forks of branches or in cavities of decayed trees; and in these nests, constructed of soft grass, the females bring forth and rear their young (generally two at a birth). Dr. Smith states that the food of the Moholi consists principally of pulpy fruits, though there is reason to believe it also consumes insects, as remains of the latter were discovered in the stomachs of several individuals which he examined.

Dr. Smith, for the reasons stated in his work, considers this animal different from Galago Senegalensis. He gives an elaborate anatomical description and good figures of the more important and interesting parts of this animal.

The general colour is grey, with wavy or brindled markings of a darker tint, and the limbs are washed with yellow; under-parts white; tail red-brown; ears flesh-coloured. Length from nose to tip of tail, sixteen inches.

209.—The Banca Tarsier

(*Tarsius Bancanus*, Horsf.). This species was obtained by Dr. Horsfield in Banca, near Jeboos, one of the mining districts, where it inhabits the extensive forests.

The fur is deep, soft, thick, and woolly, enveloping the head, body, limbs, and root of tail, where it terminates abruptly. The general colour is brown inclining to grey, especially on the inside of the limbs and the under parts; a rufous wash appears on the head and outer surface of the limbs. The tail, which equals the head and body in length, is nearly naked, except at its base: towards the extremity it is covered with a soft down, which forms, near the tip, a very obscure tuft. The backs of the hands are covered with a very soft down: the palms are naked, and provided with several prominent cushions, calculated to assist in climbing and perching with safety on the branches. Of its habits no details have been collected.

Genus Chiromys. This genus was established by Cuvier for the reception of that extraordinary animal the Aye-Aye, respecting the affinities of which so many conflicting opinions have been advanced.

210, 211.—The Aye-Aye

(*Chiromys Madagascariensis*) is a native of Madagascar, where it appears to be extremely rare, and chiefly, if not exclusively, restricted to the western part: most probably it tenants remote solitudes, seldom visited by the natives, and never by Europeans. Only one specimen exists in Europe, viz. that brought home by Sonnerat, its discoverer, who first figured and described the animal in his 'Voyage aux Indes' (Paris 1781). It is deposited in the Museum of Paris.

Sonnerat regarded the Aye-Aye (so called, like one of the sloths, from its cry) as allied to the Lemurs, the Monkeys, and the Squirrels; and subsequent writers have taken opposite views, according as they have been biassed by one part of its organization or another, or according to their ideas of the respective value of characters, deduced from one set of organs or another. Pennant, Gmelin, Cuvier, Fleming, and Swainson, place it among the Rodents; Linnæus and Schreber regard it as a Lemur.

M. de Blainville, in his pamphlet 'Sur quelques Anomalies de système Dentaire,' &c., observes, that notwithstanding the rodent-like character of its teeth, the rest of its organization, its manners, and habits prove it to be a true Lemur, having absolutely no relationship with the Rodents, no affinity to them, in spite of all that many naturalists have imagined; and, after a careful examination of the specimen and skull, we coincide in this opinion.

The teeth consist only of incisors and molars (see skull, Fig. 212): the incisors are two in each jaw, strong and powerful: those below are compressed laterally, but are deep from back to front; their roots are carried backwards each in an alveolus, or socket, extending almost the whole length of the ramus of the jaw; they are acutely pointed, their apex resembling a ploughshare. These teeth strongly remind one of the huge curved canines in the lower jaw of the Hippopotamus. The upper incisors are not so obliquely pointed, and are also smaller than the lower. Between the incisors and the molars an unoccupied space intervenes. The molars are 4 on each side above, 3 below, small, and of simple structure. The head is moderate and rounded, and the muzzle is rather short and pointed. The eyes are very large and nocturnal. The osseous ring of the orbits is complete (Fig. 212). The ears are large; and obscure furrows on their internal aspect seem to denote that, as in many bats, they are capable of being folded down: they are, in fact, bat-like, black, naked and smooth.

The fore paws have each five fingers; that which represents the thumb is short, and arises beyond the base of the rest; these are long and slender: the middle finger is very thin, but it is exceeded in length by the third or ring finger; the thumb is not opposable, and, like the other fingers is furnished with a strong, sharp, hooked claw. The arms are short in proportion to the posterior limbs; the latter being long, and terminating in prehensile feet. The thumb is well developed and protected by a flat nail: the toes are of moderate length and stoutness, but the first is the shortest, and, as in the Lemurs, is armed with a straight pointed claw; the rest have large hooked claws. The tail is long and bushy, with coarse black or brownish-black hairs: the general colour is ferruginous-brown, passing into grey on the sides of the head, the throat, and belly; the feet are nearly black Beneath the brown outer-coat there is on the back and limbs a fine thick under-coat of soft yellow wool, which appears more or less through the outer. In the female the teats are two and ventral. Length of head and body 1 foot 6 inches; the tail being nearly the same.

According to Sonnerat, who kept two of these animals, a male and female, in captivity, it would appear that the habits of the Aye-Aye are nocturnal. By day they see with difficulty, and the eyes, which are of an ochre colour, resemble those of an owl. Timid and inoffensive, they pass the day in sleep, and when roused up their motions are slow, like those of the Loris: they have also the same fondness for warmth; their thick fur indeed sufficiently proves their impatience of cold. During the day the Aye-Aye conceals itself in its secluded retreat, some hole or excavation, whence it issues forth on the approach of darkness in quest of food; its diet consists of buds and fruits, together with insects and their larvæ; for the latter it searches the crevices and bark of trees, drawing them forth by means of its long finger, and so conveying them to its mouth Sonnerat kept his specimens alive for two months, feeding them upon boiled rice, in taking up which they used their long slender fingers, much in the same manner as the Chinese do their chop-sticks Sonnerat remarks that, during the whole of the time these animals lived, he never observed them set up their long bushy tail, like a squirrel, but that, on the contrary, it was always kept trailing at length.

Considering the length of time that has intervened since the discovery of the Aye-Aye by Sonnerat, and visited as the island of Madagascar has been by Europeans, it is somewhat strange that no additional specimens should have been obtained, and that not a single notice of a living individual having been seen or captured should have appeared

Genus Galeopithecus. This genus contains those strange animals the Colugos, called Flying Lemurs, Flying Cats, Flying Foxes, &c., by voyagers. The first notice of the Colugo is by Bontius, who terms it "Vespertilio admirabilis." It was afterwards figured by Seba, under the name of Felis volans Ternatanus: Linnæus subsequently placed it among the Lemurs under the title of Lemur volans. Cuvier places it at the end of the Bats. The query then at once arises, to what group is the Colugo to be referred? M Geoffroy, who denies its relationship to the Bats, observes that it is still less a Lemur, and that its head is altogether that of a true "Carnassier." Notwithstanding this authority, in our views its affinities, intermediate as they may be between the Lemurs and other groups, place it within the pale of the Lemurine family.

213.—The Colugo

is an animal of the size of a cat, furnished with an extensive parachute consisting of a lateral membrane, not only between the anterior and posterior limbs, but also between the posterior limbs, so as to include the tail, which is of considerable length: the fingers of the fore paws are also included in this extensive membranous expansion The whole of the upper surface of the body and lateral membranes is covered with woolly fur, but the under surface is nearly naked. The parachute is capable of being folded up; but when on the stretch for action it forms a wide expanse, not indeed endowing its possessor with true powers of flight, but enabling it to take long sweeping leaps from tree to tree with the utmost facility.

The general aspect of the head is Lemurine: the muzzle is produced; the nostrils are lateral, naked, and sinuous, the eyes moderate, the ears short and pointed. The anterior limbs are long: the hands are divided into five fingers, the first, or thumb, separated from the rest though not antagonizing with them, is short, the remaining four are nearly equal, all are armed, not with flat nails, but with large deep, hooked, sharp-edged, and retractile claws. The hinder limbs slightly exceed the fore limbs in length, and the feet are similar in character to the fore hands.

Fred Cuvier gives the Dental formula as follows —

$$\text{Incisors, } \frac{4}{6}\text{; canines, } \frac{0-0}{0-0}\text{; molars, } \frac{6\ \ 6}{6\ \ 6} = 34.$$

(Fig. 214.) Mr. Waterhouse, whose excellent paper on the skull of the Colugo is in the 'Zoological Transactions,' vol. ii, gives the dentition thus —

$$\text{Incisors, } \frac{2-2}{4}\text{; canines, } \frac{0-0}{1-1}\text{; false molars, } \frac{2-2}{2-2}\text{,}$$

$$\text{true molars, } \frac{4-4}{4-4} = 34.$$

The upper incisors are placed laterally in pairs, with a wide interval between each pair, occupying the anterior part of the jaw: the first is small, compressed and jagged, or pectinated, the second is similar, but somewhat larger. The two false molars above rise up with sharp points, the molars are crowned with acute insectivorous tubercles. The lower incisors are deeply and finely pectinate. (Figs. 216, 218, Nos. 4 and 5.) The canines are serrated

Some naturalists have considered the species of Colugo to be three; while Fischer and others recognise only one, varying in colour according to age or sex. It has, however, been demonstrated by Mr. Waterhouse, from a rigorous investigation of a series of skulls, that there are two distinct species, and at one of the scientific meetings of the Zoological Society of London (Oct. 1838) he pointed out the distinguishing characteristics.

He remarked, that in systematic works three species of the genus Galeopithecus are described, founded upon differences of size and colour: as regards the latter character, he had never seen two specimens which precisely agreed; and with respect to size, the dimensions given of two out of the three species are, he observed, evidently taken from extremely young animals. Mr. Waterhouse then proceeded to distinguish the two species on the table, and proposed for them the specific names of Temminckii and Philippinensis.

The first and larger species measured about two feet in total length, and its skull was two inches eleven lines and a half in length. The anterior incisor of the upper jaw is broad, and divided by two notches into three distinct lobes, the next incisor on each side has its anterior and posterior margins notched, and the first molar (or the tooth which occupies the situation of the canine) has its posterior edge distinctly notched. This tooth is separated by a narrow space, anteriorly and posteriorly, from the second incisor in front and the second molar behind; the temporal ridges converge towards the occiput, near which, however, he observed, they are separated usually by a space of about four lines. This is probably the Galeopithecus volans of authors, but the identity cannot be said to be certain.

The second species, G. Philippinensis, was described by Mr. Waterhouse as being usually about twenty inches in length, and its skull as measuring two inches seven lines in length. He observed, that this species may be distinguished from C. Temminckii by the proportionately larger ears, and the greater length of the hands. The skull, too, he described as narrower in proportion to its length, the muzzle as broader and more obtuse, and the orbit as smaller. The temporal ridges, he remarked, generally meet near the occiput, or are separated by a very narrow space. The anterior incisor of the upper jaw is narrow, and has but one notch; the next incisor on each size is considerably larger, longer, and stronger than in G. Temminckii, and differs moreover in having its edges even the same remark applied to the first false molar. In this species the incisors and molars form a continuous series, each tooth being in contact with that which precedes and that which is behind it. But Mr. Waterhouse concluded by observing that the most important difference perhaps which exists between the two species in question consists in the much larger size of the molar teeth in the smaller skull, the five posterior molars occupying a space of ten lines in length, whereas in G. Temminckii, a much larger animal, the same teeth only occupy nine lines. Several minor points of distinction existed besides those here mentioned. ('Zoological Proceedings,' 1838, and see further, 'Zoological Transactions, vol. ii p 335.)

If the reader will turn to Figs 215, 216, 217, 218, he will be enabled to compare the form of the skull, and the variations in the characters of the teeth presented by these two species respectively Fig 215 represents the skull of the Galeopithecus Temminckii, *a*, as seen from above, *b*, as seen from below Fig 216 represents the lower jaw and teeth of the same species (G. Temminckii): 1, the under side of the lower jaw, 2, side view of the same, 3, the three foremost teeth on either side of the upper jaw, 4, 5, outer and inner incisors of the lower jaw. Fig. 217 represents the skull of G. Philippinensis: *a*, the upper side, *b*, the under side. Fig 218 represents the lower jaw and teeth of the same species (G. Philippinensis) 1, under side of the lower jaw, 2, side view of the same, 3, the three foremost teeth of the upper jaw, 4, 5, outer and inner incisors of the lower jaw If these skulls and teeth be compared, so many and important distinctions will be perceived, that all doubt as to the correctness of the views entertained by Mr Waterhouse will be dissipated.

These strange and perplexing animals are natives of the Moluccas, Philippines, and various islands of the Indian Archipelago. In their habits they are arboreal and nocturnal, and feed, as it is supposed, upon fruits, insects, eggs, and birds. During the day they remain in the depths of the forests, suspended like a bat from the branches, with the head downwards, and clinging by the hinder claws, immersed in tranquil sleep At night they rouse up, are active in traversing the trees in every direction and sweeping from one to another with great address, in search of food Though of a disagreeable odour, their flesh is eaten by the natives. The females are said to produce two young at a birth, which adhere to the teats of their parent. Camelli, in a MS. on the subject in the British Museum, asserts the female to have a double abdominal pouch, in which the young are carried, but in this statement he is certainly erroneous.

FOSSIL QUADRUMANA.

It is only very recently that the fossil relics of puadrumanous animals have been discovered; previously to this discovery, the Quadrumana were regarded as having no fossil prototypes. In 1836 M. Lartet announced his discovery of the fossil bones of a large monkey, consisting of a lower jaw with its dentition complete, a molar tooth with four tubercles, a bone of one of the fingers, a portion of the thigh bone, together with the bones of the instep, &c. They were found at Sanson, two leagues south of Auch (in the department of Gers), in a tertiary formation extending from the south of Auch to the foot of the Pyrenees, and apparently the result of a long succession of water alluvia. From the characters of the dentition, there can be no doubt that the animal belonged to one of the old world sections of the Simiæ, namely, the Gibbons (Hylobates), if indeed it be not the representative of a genus no longer extant. M. Lartet has named this fossil species Pithecus antiquus. With these relics occurred those also of the Mastodon, Rhinoceros, Deinotherium, Palæotherium, &c. Within the last few years the fossil relics of three species of ape or monkey have been discovered in the Sewalik hills, a portion of sub-Himalayan range imbedded in a tertiary stratum. Two of these species are due to the researches of Captains Falconer and Cautley, and one to the labours of Lieutenants Baker and Duvaud Of these fossil Simiadæ, one, as the fragments indicate, exceeded in size any living species of the present day: the second was also a large animal, superior to the Entellus monkey in size, the third appears to have been about equal to the Entellus, and was probably an Orang.

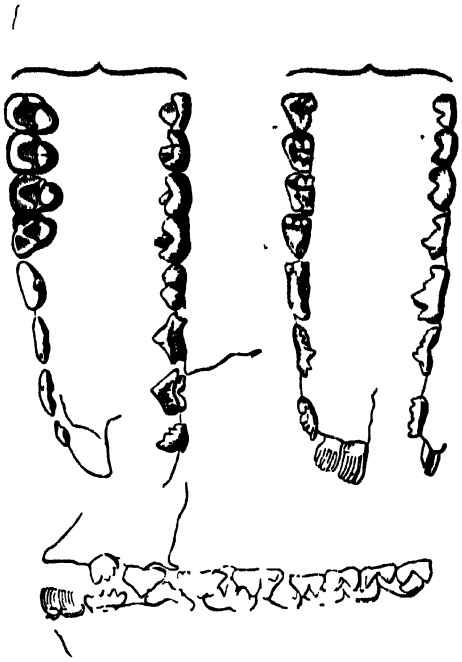
In the basin of the Rio des Velhas in South America, Dr Lund, a Swedish naturalist, has discovered the fossil remains of extinct Quadrumana; and it is interesting to know that they belong to a form closely related to that of the existing American monkeys termed Sapajous, but the animals must have far exceeded any living species. The larger, indeed, must have been upwards of four feet in height. Dr Lund terms it Protopithecus Brasiliensis, the other, and smaller, he terms Callithrix primævus. We have then evidences of the existence of Quadrumana at a remote epoch, in continental Europe, Asia, and America; but what is more unexpected, we have proofs that, at some era, they existed in our island (if then an island), when, as we may imagine, its surface was very different from what it now appears.

The first example, a portion of the lower jaw, containing the last molar teeth, was found with the teeth of sharks (in 1837) in a deep layer of whitish sand, beneath a stratum of blue clay on the banks of the river Deben, at Kingston, near Woodbridge, in Suffolk. This bed of clay is in many places overlaid by crag, and may probably be assigned to the age of the London clay. In the stratum of sand the fossil teeth and portions of the lower jaw of an opossum were also discovered. (See 'Mag. Nat Hist' 1839, pp 418, 450) The extinct monkey, as proved by the characters of the molar tooth, belonged to the genus Macacus, or at least to a genus very closely related to it. The tooth, it may be observed, is somewhat narrower than in any recent species of Macacus, but the posterior fifth tubercle presents, as in most of that group, two cusps, instead of being simple, as in the genus Semnopithecus

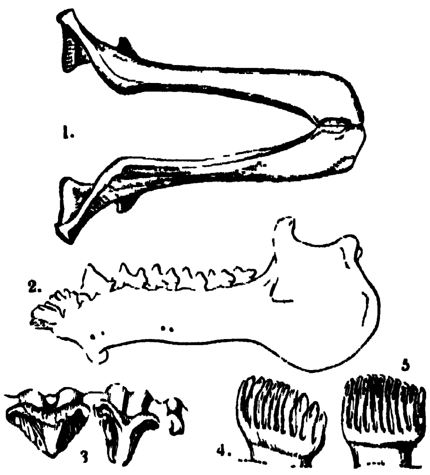
In the 'Annals of Natural History,' Nov 1839, Professor Owen describes a second tooth found in the same locality, which he identifies as the second molar of a Macaque, and from being well worn, it is evident that the individual to which it belonged was aged at the time of its death It differs from the corresponding tooth of a recent Macaque, in having a slight ridge along the base of the anterior part of the crown, and the same character occurs also in the molar previously alluded to, and which was rigorously examined by the same philosophic anatomist M d'Orbigny's remark respecting the beds above the chalk in the neighbourhood of Meudon seems applicable in the present case, viz:—"that in the lower part of the plastic clay, new features are discovered to obtain, demonstrating in an especial manner, that various genera of Mammals were living at the epoch when that layer was formed."

That the Simiæ should have existed in our latitudes at the time of the deposition of the London clay is not surprising, when we consider the tropical character of the fossil fruits so abundant in that deposit: we say London clay (as the geologists designate it), because the blue stratum, beneath which the fossil teeth were found, belongs undoubtedly to that formation Mr Wood, in reference to one of these relics, observes, "As this fossil certainly belongs to some quadrumanous animal, there is no formation to which it could be so appropriately assigned as that of the London clay; the tropical character of the Fauna as well as the Flora of that period being such as to justify an assumption of a warmer climate quite suitable to the existence of our macacus" Besides the teeth of animals of the monkey tribe, a fragment of the jaw of an opossum, in which one of the false molars is retained, has been discovered in the same deposit.

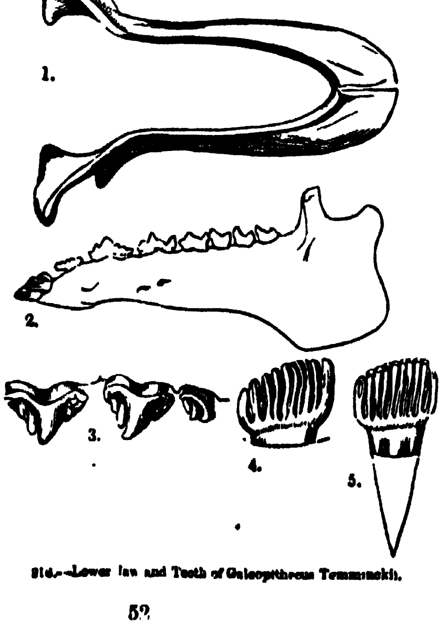
211.—Aye-Aye.



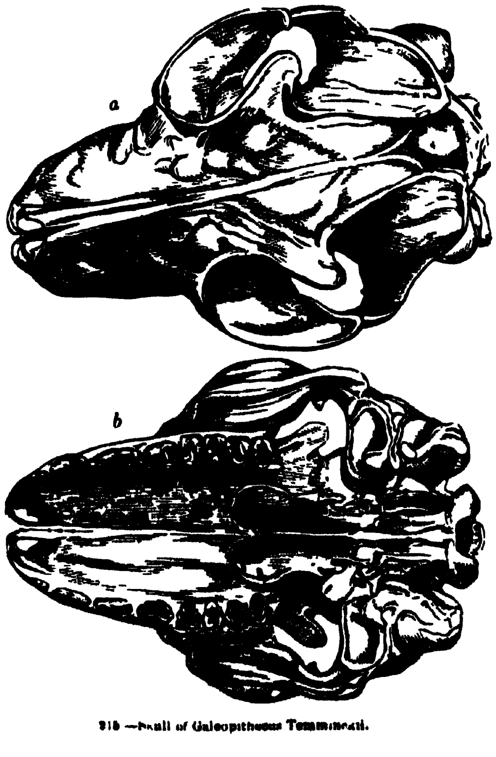
214.—Teeth of Colugo



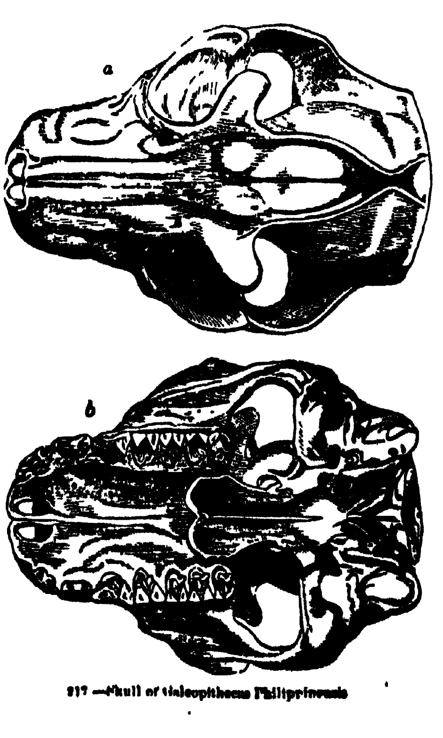
218.—Lower Jaw and Teeth of Galeopithecus Philippinensis.



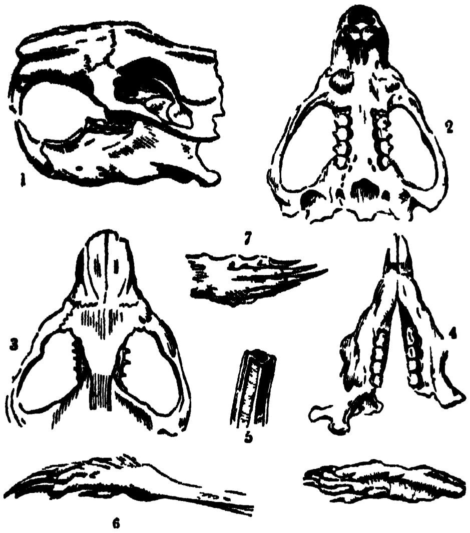
216.—Lower Jaw and Teeth of Galeopithecus Temminckii.



215.—Skull of Galeopithecus Temminckii.

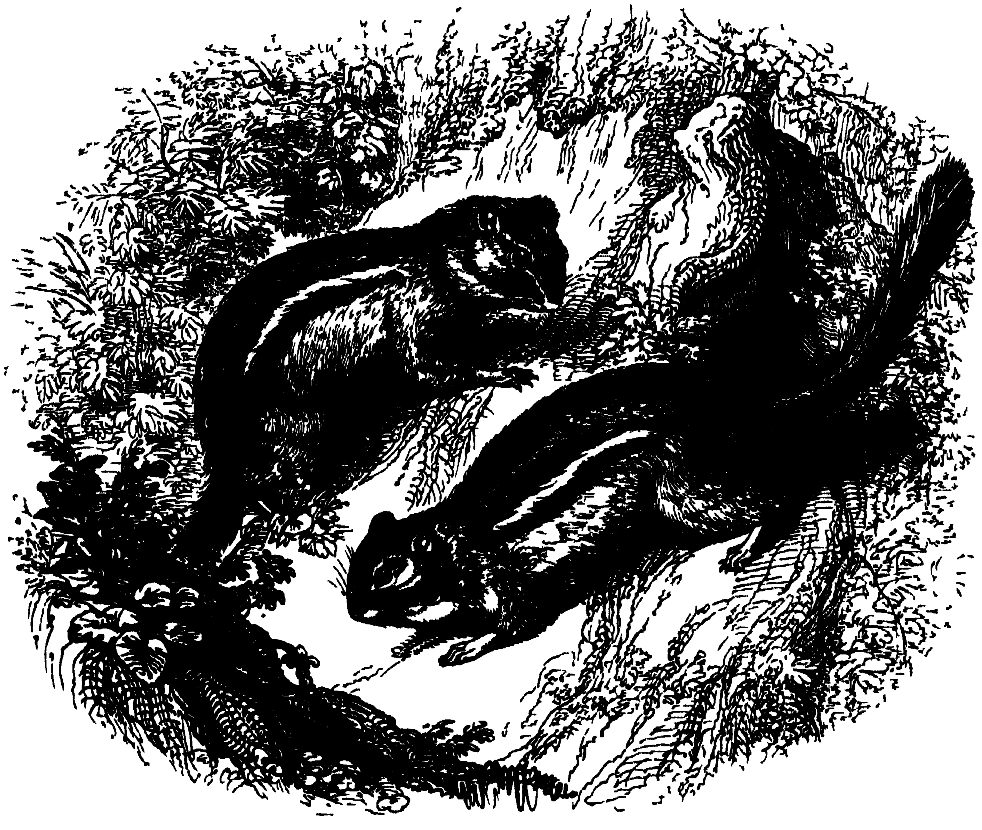


217.—Skull of Galeopithecus Philippinensis



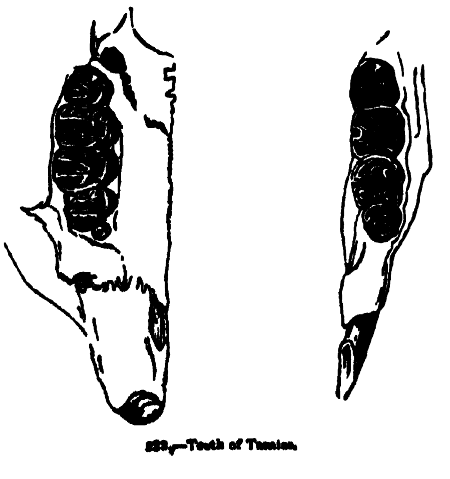
219.—Skull, Teeth, and Paws of Aplodontia

220. Northern Grey and Black Squirrel.



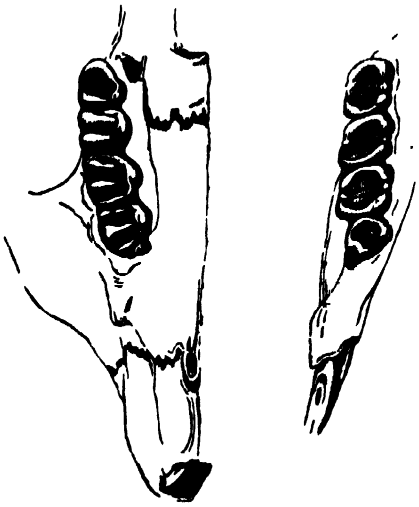
221.—Common Ground Squirrel

222.—Rocky Mountain Flying Squirrel



223.—Teeth of Tamias.

225.—Malabar Squirrel.



224.—Teeth of Sciurus

ORDER RODENTIA.

The difficulty of instituting a natural arrangement (that is, an arrangement exhibiting the multiform links and affinities of different groups), is confessedly a work of difficulty; but peculiarly so as it respects the component parts of the present order. In itself, indeed, this order is definite, and based upon characters which form a clear line of separation between it and every other; but when we come to investigate the species it embraces, we soon feel ourselves perplexed among a multitude of forms, and begin to hesitate at every step. Hence it is that no two naturalists have arranged the Rodentia in the same manner; nay, Cuvier himself, in the last edition of his 'Règne Animal,' set aside the principles by which in his earlier edition he was guided, and followed out other views.

Among those naturalists who have lately devoted their attention to the Rodentia, Mr. Waterhouse takes a foremost place; and his arrangement, founded on the truest philosophical principles, is a decided step in the advancement of this department of Zoology. It would be out of place, in a work like the present, to follow this naturalist through his train of researches, but we may give an outline of their results. Mr. Waterhouse considers that the Rodents resolve themselves into three great primary sections: first, the Murine section; secondly, the Hystricine section; and thirdly, the Leporine section.

Each of these sections embraces several families, each of the latter comprehending several genera. The principal genera contained in the Murine section are Sciurus, Arctomys, Spermophilus, Tamias, Myoxus, Dipus, Mus, Arvicola, Geomys, and Castor. The principal genera contained in the Hystricine section are Bathurgus, Orycterus, Poephagomys, Octodon, Abrocoma, Myopotamus, Capromys, Echimys, Aulacodus, Histrix, Dasyprocta, Chinchilla, Cavia, and Hydrochærus. The Leporine section contains the genera Lepus and Lagomys.

Respecting a few genera, as Ctenodactylus, Helamys, Otomys (Smith, not F. Cuvier), Akodon, and Heteromys, Mr. Waterhouse has not been able to satisfy himself as to their precise systematic classification; and with respect to the genus Aplodontia (Fig. 218, skull and teeth), though he places it in the Squirrel family (Sciuridæ), yet it differs, as he admits, in the absence of a post-orbital process to the skull, and the molar teeth being rootless. We may here remark that the genus Aplodontia contains a Rodent, called by Lewis and Clark the Sewellel (A. leporina), and which inhabits the neighbourhood of the Columbia river (N. America), where it lives in burrows, and associates in small companies. The head is large, the nose is thick and obtuse, covered with a dense coat of short fur; eye very small; ear resembling the human in form. Body short, thick, and rabbit-like. Legs very short, and covered down to the wrists and heels with fur similar to that on the body: a little above the wrist joint, on the inner side, is a small tuft of stiff white hairs. Fur like that of a rabbit out of season, amber and chestnut-brown above; greyish or clove-brown beneath; lips whitish; a rather large spot of pure white on the throat; some white hairs dispersed through the fur. Tail slender, cylindrical, hardly half an inch long. The figure (219) represents the skull, teeth and paws: 1, anterior half of skull with lower jaw, profile; 2, anterior half of skull seen from below; 3, the same seen from above; 4, lower jaw with right condyle broken, seen from above; 5, upper molar tooth; 6, 7, fore-foot, upper surface; 8, sole of hind-foot.

The Rodentia, as the name implies, have the teeth constructed for gnawing, paring, or scraping down the substances on which they feed. The teeth are only of two kinds, incisors and molars. There are no canines; and between the incisors, which project from the very apex of the jaws, and the molars, which are situated far back, there intervenes an unfilled space of considerable extent. The incisors are universally two in number in each jaw (if we except the hares and rabbits, in which two minute incisors rise at the back of the large permanent ones): these are strong, compressed, and somewhat curved, with sharp chisel-shaped edges. It is only their anterior surface that is covered with a thick layer of enamel, and this layer forms the cutting edge, as does the layer of steel on softer metal composing a common chisel. Their insertion into their sockets is very deep, but the inserted part is not a true root: these incisors spring from a pulpy germ in their base, from which they are perpetually growing, and this growth bears a due proportion to the rapidity with which their cutting edges wear away by use. So imperative is this law, that where one incisor is lost by accident, its opposite, having no countercheck, keeps increasing, till it acquires an enormous development, to the annoyance, and often the destruction, of the sufferer. With regard to the molars it may be observed that they differ in number in different species: they are, however, generally characterised by a flat surface; traversed transversely by ridges of enamel, their structure being composed of perpendicular folds of this substance, compacted together by intervening osseus matter; but further than this, we find in different species a structural distinction of physiological importance: in some, as the Arvicolidæ, they resemble the incisors, having no true solid roots, but are perpetually growing as their surface wears away; in others, on the contrary (as the squirrels), at a certain period they gain truly formed roots, and after this cease all further growth. In the Rodentia the upper lip, which is cleft longitudinally, is in many species an organ of prehension; or at least is of great importance in gradually transmitting the food into the mouth, as may be seen when we offer the rabbit a leaf, or a stalk of clover, or dandelion. The pharynx, or back of the mouth, is contracted, and in some species funnel-shaped, and capable of being closed by a circular muscle, in order that the food may pass gradually, as it becomes duly ground to pulp between the molars. The structural organisation of the Rodents, as evidenced by the characters of the skull, the bird-like condition of the brain, and by other points, is at a low par, and the ratio of their intelligence is in a parallel degree. We may tame them, but we cannot educate them. They are all timid and feeble, and trust for self-protection to flight or concealment The prey of ferocious beasts and birds and reptiles, their fertility, by a wise provision, counterbalances their annual diminution. Spread over the earth, from the equator to the coldest latitudes, they tenant rocks and mountains, plains and woods, feeding on grain and vegetables, and often devastating the cultivated domains of man. To a vegetable diet some few, as the rat, add animal food also. Most are nocturnal or crepuscular in their habits; many dwell in burrows, some conceal themselves amidst herbage, some amongst the foliage of trees, and some build for themselves habitations which have excited the interest and admiration of man.

In noticing the numerical abundance of the Rodentia, throughout the different quarters of the globe, it should be observed that in Australia six or eight species are all that we are acquainted with belonging to that region; Europe, North America, and South America are nearly equal as to the number of species they contain. India and Africa are also nearly equal, but they contain fewer species than either of the other provinces. The squirrels, rats, porcupines, and hares are the only groups found in all the provinces; all the rest of the groups are respectively confined to their own particular geographical province. The naturalist will find some important observations on the Rodentia by Mr. Waterhouse, in the 'Zool. Proceeds.,' for 1839; in the 'Zool. of the Voyage of H.M.S. Beagle;' and in the 'Mag. of Nat. Hist.,' New Series, 1839, p. 90.

The squirrels (Fam. Sciuridæ). These elegant animals are distributed throughout every quarter of the world, Australia excepted. The general characters of the true squirrels (Sciurus), as exhibited by our well-known British species, are familiar to all: its fine full eyes, its light contour, its activity, its deep soft fur, and long bushy tail, have contributed to render it a general favourite. They are furnished with proper clavicles, or collar-bones, and possess the use of the fore-arm and paws in a high degree of perfection; the toes are four, with the rudiment of a thumb, on the anterior feet; five on the hind feet; the claws are sharp and hooked. Molars, $\frac{5-5}{4-4}$. Ears often tufted with a pencil of long hairs. In feeding, these animals sit up on the haunches, and hold their food (nuts, &c.) not between the fingers of their joined fore-paws, but between the rudimentary thumbs, while they work at it with their teeth.

220.—The Northern Grey and Black Squirrel

(*Sciurus leucotis*). It is to Dr. Bachman, D.D., President of the Lit. and Phil. Soc., Charlestown, S. Carolina, that we are indebted for clearing up the mass of confusion in which the squirrels of America have been involved.

It appears from this author that several black squirrels exist, totally distinct from each other, and that of these some are mere varieties. Of the genuine species he notices the large Louisiana black squirrel (S. Audubonii), the black squirrel (Sciurus niger, Linn., not Catesby), and the dusky squirrel (S. nigrescens). There is a black variety of the fox squirrel (Sc. capistratus), and a black variety of the northern grey squirrel, the species figured. The grey squirrels are numerous, and perplexing to the naturalist. The Northern grey squirrel has been, for instance, confounded with the Carolina grey squirrel, from which it is distinct. The Northern grey and black squirrel is a very common species, and exceedingly active and sprightly. It is spread through the Northern and Middle States: it is abundant in New York and in the mountainous parts of Pennsylvania, and extends as far north as Hudson's Bay: southwards, it occurs in Virginia, and perhaps still farther south.

Like all the true squirrels, this species is arboreal in its habits, quick and alert:—it rises with the sun, and continues industriously engaged in search of food during four or five hours in the morning, running over logs, ascending trees and playfully coursing from limb to limb. During the warm weather of spring it prepares its cradle or nest on the branch of a tree, constructing it of dried sticks which it breaks off, or, if these are not at hand, of green twigs as thick as a finger, which it gnaws from the boughs. These it lays in the fork of a tree or of some large branch so as to make a framework: it then lines this framework with leaves; and over these again spreads a layer of moss. In the preparation of this nest, a pair is usually engaged for an hour in the morning, during several successive days, and the noise they make in cutting the branches and dragging the leaves may be heard at some distance. In winter they reside entirely in holes of trees, where their young in most instances are brought forth. The young are from four to six in number; and in a few weeks are sufficiently advanced to leave their nest. It is generally believed that this squirrel lays up a great hoard of food as a winter supply, but Dr. Bachman doubts the fact, though he admits that other northern species do. Further he states that the species which inhabit the southern portion of the United States, where the ground is seldom covered with snow, derive in winter a precarious subsistence from seeds, insects, and worms, which are scratched up among the leaves. We may here observe that, singular enough, no one has noticed the fact, excepting Mr. C. Coward ('Mag. Nat. Hist.,' New Series, June, 1839, p. 311), of our common British squirrel being carnivorous as well as frugivorous; such is, however, the case: it attacks young birds and greedily devours them, nor is even the wood-pigeon safe from its assaults. The Northern grey squirrel feeds on nuts and various seeds, but it seems to prefer the shell-bark (Carya alba) and the several species of hickory to any other food. Green corn and young wheat suffer greatly from its depredations, and hence a war of wholesale destruction is everywhere waged against it. In Pennsylvania an old law existed offering threepence a head for every squirrel destroyed, and in 1749 the enormous sum of 8000*l*. was paid out of the treasury for the destruction of these depredators. The extensive migrations which are undertaken by this species, either from a scarcity of food or from some other inexplicable cause, have often excited not only wonder, but apprehension. They generally take place in autumn, but by no means with regularity. It would appear that in the far north-west multitudes congregate in different districts, forming scattered troops, which all bend their way instinctively in an eastern direction, collecting into larger bodies as they proceed; neither mountains nor rivers stop their progress: onward they come, a devouring army, laying waste the corn and wheat fields of the farmer; and as their numbers are thinned by the gun, others fill up the ranks: few, perhaps none, ever return westwardly; those that escape the carnage take up their abode in the forests of their newly-explored country. The grey squirrel has many enemies; the fox, the lynx, the weasel, hawks, and owls are all eager to seize it: when attacked by the red-tailed hawk, its most formidable foe, it is amusing to see the skill and dexterity exercised by both, in the attack, and in the defence; often, indeed, the squirrel, by dodging and twisting round the branches and large limbs of the tree, foils and wears out his antagonist; when, however, a pair of hawks combine, the squirrel has no chance.

221.—The Malabar Squirrel

(*Sciurus maximus*). Of the Indian squirrels, one of the finest is the Malabar squirrel, measuring fourteen or fifteen inches in the length of the head and body, and somewhat more in that of its full bushy tail. This species is found in Malabar, and also in Ceylon. Like the rest of its tribe, it is eminently arboreal, tenanting the summits of palm-trees, and feeding to a great extent upon the cocoa-nut, to the milk of which it is said to be very partial. We have seen several specimens in captivity. They soon become tame and familiar, but are not to be trusted too far: their bite is very severe. General colour above, rich chocolate, deepening about the shoulders into black; under parts abruptly pale reddish yellow; ears tufted with a long full brush.

222.—The Rocky-Mountain Flying Squirrel

(*Pteromys Alpinus*, or *Pt. Sabinus*, var. β, Richardson). The flying squirrels (Petromys, Geofr.: Sciuropterus, F. Cuv.) agree in the general characters of their dentition with the rest of the family (see Fig.

223 for the teeth of Tamias, and Fig. 224 for the teeth of Sciurus). The incisors are laterally compressed: the molars, $\frac{5-5}{4-4}$, rarely $\frac{4-4}{4-4}$, are equal in size or nearly so, excepting the anterior molar of the upper jaw, where they are 5—5, which is smaller than the rest. The series of molars on each side are widely separate and parallel. It is in the possession of a lateral fold of skin, forming, when extended, a parachute, enabling them to take long sweeping leaps, that the flying squirrels are distinguishable from the ordinary group. These expansions are fully clothed with soft fur; and they usually project in a pointed form from each wrist, being there supported by a long slender osseous stylet. In some species, as the one figured, this is either reduced to a mere tubercle or wanting.

The flying squirrels are conspicuous for the rapidity of their evolutions: they ascend the trees with such velocity that the eye can scarcely follow them; and they skim from one tree to another, or precipitate themselves to the ground, with singular agility. In their habits they are nocturnal.

These elegant animals are respectively natives of the northern regions of Europe, the north of Asia, the north of America, and the glowing islands of the Indian Archipelago. The present species is one of the American flying squirrels, and was discovered by Dr. Drummond, on the Rocky Mountains, where it lives in dense pine-forests, seldom venturing from its retreat except in the night. Dr. Richardson received specimens from the Elk river, and also from the south branch of the Mackenzie. Whether it is a mere variety of the Pt. Sabrinus or a distinct species is not clear.

Its general colour is yellowish-brown above. The tail is flat, longer than the body, and blackish-grey. Total length fourteen inches three lines, of which the tail, including the fur, measures six inches three lines.

225.—The Common Ground-Squirrel

(*Tamias striatus*). Unlike the true squirrels, the ground-squirrels are chiefly terrestrial in their habits, and are furnished with cheek-pouches, in which they carry food to their retreats, forming magazines for winter. They live in burrows, but do not appear to become torpid. Their fur is shorter and closer, and the tail less bushy than in their arboreal relatives. These animals are chiefly spread through the northern and temperate regions of Europe, Asia, and America. The palm-squirrel of India, and the Barbary squirrel, though associated by some authors with the ground-squirrels, occupy an intermediate situation between the latter and the true arboreal species.

The common ground-squirrel is a native of the north-eastern part of Europe and the north of Asia. It is the Ecureuil Suisse of the French, so called because its striped back has some resemblance to a Swiss doublet. According to Pallas, these striped squirrels dig their burrows in woody places, in small hummocks of earth, or near the roots of trees; but never, like the common squirrels, make their nests in the trunk or branches, although when scared from their holes they climb with facility, and make their way from branch to branch with great speed. A winding passage leads to their nest, and they generally form two or three lateral chambers to store their food in. The striped squirrel in its manners, and from having cheek-pouches, is allied to the hamster and Citillus (type of the genus Spermophilus), and is likewise connected with the latter by its convex nose, proper for an animal accustomed to dig. In its whole habit it differs from the squirrels which live in trees, and forms, with other striped squirrels, a division of the genus. It has a longer head than the common squirrel; rounded ears, not tufted; a roundish, hairy tail, which it less frequently turns up; a slender body, and shorter limbs. The fur likewise is very short and less fine. Yet in its diurnal habits, and in not becoming torpid in winter, it comes near the squirrels: it is difficult to tame.

226.—Parry's Spermophile

(*Spermophilus Parryi*). The genus Spermophilus is intermediate between the Ground-Squirrels and the Marmots. Besides possessing cheek-pouches, the Spermophiles are distinguished by the closeness of the ears, the slender form of the body, which is squirrel-like, and the narrowness of the paws.

Two species are natives of eastern Europe, viz. the Souslik of the Volga, and the Zizel or Susel of Hungary, Poland, &c., which are, perhaps, mere varieties. Many species are American, one of which, Parry's Spermophile, is the species figured.

Colour of the body above, a mixture of white thickly spotted on a grey or black ground; face chestnut; under parts rust-brown; tail with a narrow white margin, and black at the extremity. This, according to Dr. Richardson, who first named the species, is the Ground-Squirrel of Herne; the Quebec Marmot of Forster; the Seek-Seek of the Esquimaux; the Thœ-thiay (Rock Badger) of the Chepewyans; and the Arctomys Alpina of Parry's 'Second Voyage.'

Dr. Richardson states that it inhabits the barren grounds skirting the sea-coast from Churchill in Hudson's Bay round by Melville Peninsula, and the whole northern extremity of the continent to Behring's Straits, where specimens precisely similar were procured by Captain Beechey. It is abundant in the neighbourhood of Fort Enterprise, near the southern verge of the Barren Grounds, in lat. 65°, and is also plentiful on Cape Parry, one of the most northern parts of the continent. It is found generally in stony districts, but seems to delight chiefly in sandy hillocks amongst rocks, where burrows, inhabited by different individuals, may be often observed crowded together. One of the society is generally observed sitting erect on the summit of a hillock whilst the others are feeding in the neighbourhood. Upon the approach of danger, he gives the alarm, and they instantly hurry to their holes, remaining however chattering at the entrance until the advance of the enemy obliges them to retire to the bottom. When their retreat is cut off, they become much terrified, and, seeking shelter in the first crevice, they not unfrequently succeed only in hiding the head and fore-part of the body, whilst the projecting tail is, as is usual with them under the influence of terror, spread out flat on the rock. Their cry, in this season of distress, strongly resembles the loud alarm of the Hudson's Bay Squirrel, and is not very unlike the sound of a watchman's rattle. The Esquimaux name is an attempt to express this sound. Herne states that they are easily tamed, and very cleanly and playful when domesticated. They never come abroad during the winter. Their food appears to be entirely vegetable; their pouches being generally filled, according to the season, with tender shoots of herbaceous plants, berries of the alpine arbutus, and of other trailing shrubs, or the seeds of grasses and leguminous plants. They produce about seven young at a time.

The true Marmots (Arctomys) are thicker, more robust, and less elegant in figure than the Spermophiles; the head is broad and flat, and the muzzle obtuse; the limbs are short, and there are no cheek-pouches.

227, 228, 229.—The Alpine Marmot

(*Arctomys Marmota*). This well-known species is common in the high mountain districts of Europe, where it takes up its abode just below the line of perpetual snow, excavating a deep burrow, to which it has recourse on every appearance of an enemy. In this, which it lines with dried grass, moss, &c., it hybernates during the severity of the season. The burrows of the marmot are always constructed in dry situations, and mostly on declivities exposed to the south or south-east. They are of considerable extent, and are worked out and tenanted by families consisting of from five to fifteen individuals. They begin by a passage which runs for about six feet, and is just capable of admitting the animal's body. From the farther end of this gallery two others bifurcate, one of which, according to Desmarest, leads to a sort of chamber in the form of an oven, from three to seven feet in diameter; the other ends abruptly, and serves as a storehouse for dried grasses, &c. According to some, these passages are not always to be met with, and MM. Geoffroy and F. Cuvier assert that the cell is at the end of the first gallery. During the summer months, groups of these animals may be seen feeding and sporting on the mountain side. They never wander to any great distance from their burrows, and have always one or more of their number posted as sentinels, which by a piercing cry give warning of danger. About the middle of September they betake themselves to their winter dormitories, and close the entrance with earth and the dried grass which they have accumulated: here they sink into a profound repose, from which they do not awaken till the return of April. Though timid and inoffensive, these animals defend themselves resolutely when driven to an extremity, and their powerful incisors inflict severe wounds. They lift their food to their mouths while sitting squirrel-like, and will walk on their hind-feet. On retiring for the winter, they are at first very fat, and numbers are taken at this season, partly for the sake of their skins, and partly for their flesh, which is eaten by the mountaineers. The young are easily tamed, and are often carried about by the Savoyards for the purpose of exhibition. The marmot produces from three to five at a birth.

This species is of about the size of a rabbit. Its general colour is yellowish-grey, passing into hoary about the cheeks, and blackish-grey on the top of the head; the tip of the tail is black.

230.—The Bobac.

(*Arctomys Bobac*). This species inhabits the regions of Poland through which flow the Dnieper and its tributary streams, whence it ranges through a great part of Northern Asia. It gives preference to hills of moderate elevation, where it chooses a dry locality in which to construct its burrows. These are carried to a great depth, and are tenanted by families consisting of twenty or even forty individuals. It accumulates in its retreat a quantity of dried herbage for use, before the severity of the season commences, and for early spring consumption, as well as for the sake of warmth. General colour of the fur greyish yellow mingled with brown, which latter forms transverse undulations on the upper parts. Under parts rust-brown. Length of head and body sixteen or seventeen inches; of the tail six inches.

231.—The Quebec Marmot.

(*Arctomys Empetra*). This species is one of the American marmots, and is a native of Canada and the neighbourhood of Hudson's Bay. It is the Quebec Marmot of Pennant and Godman; the Common Marmot of Langsdorff; the Thick-wood Badger of the Hudson's Bay residents; the Siffleur of the French Canadians, who apply the same name to the other species of marmot and to the badger; Tarbagan of the Russian residents on Kodiak (?); Weenusk of the Crees; Kath-hillæ-Kooay of the Chepewyans; Mus Empetra of Pallas; and Arctomys Empetra of Sabine and others.

Dr. Richardson, who gives the above synonyms, states that the Quebec marmot inhabits the woody districts from Canada to lat. 61°, and perhaps still farther north. He says that it appears to be a solitary animal, inhabits burrows in the earth, but ascends bushes and trees, probably in search of buds and other vegetable productions on which it feeds. Mr. Drummond killed two, one on some low bushes, and the other on the branch of a tree. According to Mr. Graham it burrows perpendicularly, selecting dry spots, at some distance from the coast, and feeding on the coarse grass which gathers on the river sides. The Indians capture it by pouring water into its holes. Its flesh is considered delicate when the animal is fat, but its fur is valueless.

DORMICE.

(*Myoxidæ*). The dormice seem to connect the squirrels, on the one hand, to the murine groups on the other. They are arboreal in their habits, and clothed with fine soft fur. The toes are four on each fore-foot, with the vestige of a fifth; the hind-feet have five toes. The dentition (Fig. 232) is as follows:—Incisors, $\frac{2}{2}$; molars, $\frac{4-4}{4-4}$. Incisors laterally compressed; molars unequal in size, rooted; the series on each side of each jaw widely separated and parallel.

233, 234.—The Common Dormouse

(*Myoxus avellanarius*). This elegant little creature is the Muscadin, Croque Noix, and Rat d'or of the French; Moscadino of the Italians; Liron of the Spanish; Rothe Wald-maus, Hasel-maus, and Hasel-schlafer of the Germans; Skogsmus of the Swedes; Kassel-muus of the Danes; and Pathew of the ancient British. It has been supposed by some that it was this species which the Romans fattened in their Gliraria for the table; but that animal was most probably the Loir (M. Glis), which is common in the woods of Italy, and which approaches a squirrel in size.

Though common in the southern and midland counties of England, the dormouse is not so abundant in France as the Lerot (M. Nitela, Fig. 235), yet its distribution is very extensive. It ranges from the south of Europe as far north as Sweden. The favourite resorts of this little animal are dense thickets, low woods and coppices of hazel, bushy dells, and tangled hedgerows. It creeps about the branches with a quick but gliding sort of movement, and with singular facility. It leaps nimbly, and makes its way so quickly through intertangled brushwood, that it cannot be easily captured. The dormouse appears to be in some degree gregarious, or at least to colonize favourite spots, and ten or a dozen of their nests have been seen at no great distance apart in the shrubs of a thicket. These nests are made of leaves, grass, &c.: they are of a rounded form, about six inches in diameter, with the aperture at the top. It is in these that the young are brought forth and reared. The number of the young is about four: they are born blind: in a few days, however, their eyes are opened; and in a short period they are capable of providing for themselves. Corn, haws, hazel-nuts, and fallen acorns, constitute the food of the dormouse. It eats sitting up like a squirrel, holding the food between its paws; and often it hangs suspended by its hinder feet, in which position it feeds as easily as in its ordinary attitude.

Mr. Bell states that the name Avellanarius is not well chosen, and that he never saw any dormouse that could gnaw through the shell of that nut when fully ripe. We ourselves, however, have frequently

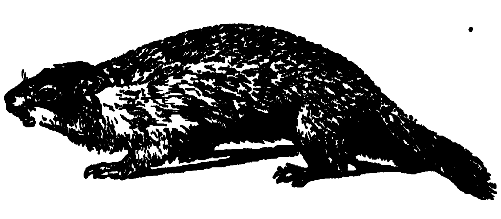
226.—Parry's Spermophile

229.—Alpine Marmot

228.—Alpine Marmot

227.—Alpine Marmots

230.—Bobac.



231.—Quebec Marmot.

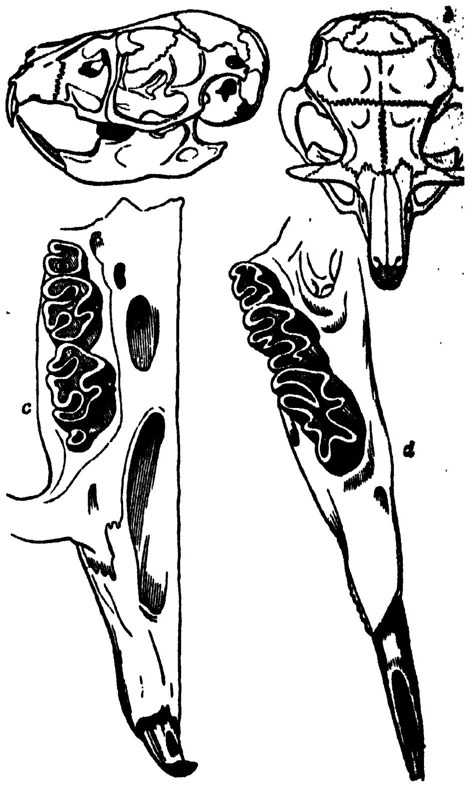
232.—Common Dormouse

234.—Common Dormouse.

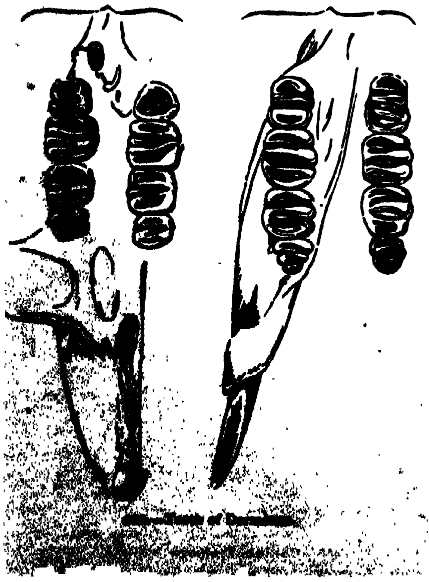
235.—Lerot, or Garden Dormouse

236.—Cape Graphiure.

239.—Egyptian Jerboas.

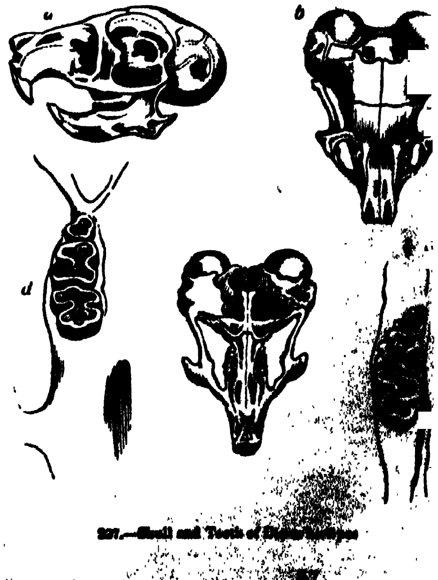


238.—Skull and Teeth of Alactaga.



[illegible]—Teeth of Dormouse.

240.—Egyptian Jerboa.



227.—Skull and Teeth of Dipus [illegible] seen the dormouse open with its teeth the hard shell of a nut, and clear it out with great address. The dormouse hybernates, and hoards up a store of provisions in holes, and the crevices about the roots of trees, &c., to which to have recourse in the winter; for its torpidity is not without interruption. A midday gleam of sunshine rouses it up in its snug retreat; and invites it forth, when it takes a little food; on the diminution of the temperature it betakes itself to its dormitory, and rolling up itself into a ball, sinks into a profound slumber. In this condition it may be handled, or rolled about a table, if not exposed to the influence of warmth, without being roused from its trance. It is not until the spring has fairly set in that the dormouse regains its full activity, and it is at this period that its magazine is of the greatest service: for without a store thus providently accumulated, it would, for some time at least, be straitened for food.

The head of this species is proportionately large; the eyes are large, black, and prominent: the ears are broad; and fur soft; the tail long, fringed with hair on each side, and somewhat tufted at the end; the body plump; the limbs short. General colour cinnamon red, passing into pale yellow below. The young are of a mouse grey. Length of the head and body two inches eight lines; of the tail, two inches six lines.

435.—The Garden Dormouse, or Lerot

(*Myoxus Nitela*). The Greater Dormouse of Shaw. This species is a native of the whole of the temperate portions of continental Europe, and indeed it is found as high north as Poland and Prussia. In France it is very common, gardens and orchards being its favourite abode: it makes sad havoc among wall-fruits, attacking peaches, apricots, pears, &c., with great avidity. Its winter store, however, consists of nuts, peas, beans, and the like, which are collected in great abundance, and stowed away in some convenient recess, where eight or ten individuals assemble to pass away the colder season in sleep. The summer nest of the Lerot, in which it rears its young, is built in the holes of walls or the chinks of aged trees. The young are four or five in number. The colour of this pretty but annoying creature is reddish grey; beneath, white; a black patch surrounds the eye, and spreads behind the ear. The tail is covered with short black hair, except at the end, which is tufted with white. Length of head and body four inches and a half; of the tail, four inches.

236.—The Cape Graphiure

(*Graphiurus Capensis*). The genus graphiurus is scarcely to be separated from Myoxus: it is represented by the Cape Graphiure, a native of South Africa. This species is about the size of the lerot, which it much resembles in the style of its colouring, the general tint above being of a deep brownish grey; the muzzle and sides of the face reddish white; under parts greyish white, with a tinge of red; tail brown, the tip, which is not tufted, reddish white; a band of blackish brown extends from the eyes to the base of the ears.

THE JERBOAS

(*Dipus*). The Jerboas constitute a group of the great murine section of Rodents, and termed by Mr. Waterhouse Dipodidæ, of which, he observes, the genera Dipus, Alactaga, and Meriones are examples.

All the animals of this tribe are remarkable for the shortness of the fore limbs, the development of the hinder limbs, and the length and slenderness of the metatarsus; they resemble in these points the kangaroos. They bound along on their hind limbs with great rapidity, and appear almost to skim, like birds, the flat plains or sandy wastes where they take up their abode. In an elaborate memoir by M. F. Cuvier on the Jerboas and Gerbilles, he divides these animals into different genera. The jerboas (Dipus) have only three toes on the hinder feet, and these, as in birds, are articulated to a single elongated metatarsal bone, commonly known as the canon-bone. In the Alactagas there are five toes; of these the three central are articulated to a single metatarsal bone, while the other two have each their own slender metatarsal bone.

In Meriones and Gerbillus the toes are five, each with their own distinct metatarsal bone. The incisors of the Alactagas are simple, whilst those in the upper jaw of the jerboas are divided longitudinally by a furrow. The molars of the latter genus are complicated in form, and but little resemble those of the former. They are four in number in the upper jaw, and three in the lower; but the first in the upper is a small rudimentary tooth, which probably disappears in aged individuals. After a detailed account of the structure of the grinding teeth, M. Cuvier observes that the general structure of the head of the Alactagas and jerboas is evidently the same, and is characterized by the large size of the cranium, the shortness of the muzzle, and, above all, by the magnitude of the suborbital foramina. The cranium of the jerboa is distinguished by its great breadth posteriorly, resulting from the enormous development of the tympanic bone, which extends beyond the occipital posteriorly and laterally, as far as the zygomatic arch, which is by no means the case in the Alactagas, where all the osseous parts of the ear are of moderate dimensions. Another differential character between the two genera is presented by the maxillary arch, which circumscribes externally the suborbital foramina, and which in the Alactagas may be said to be linear, presenting a very limited surface for the attachment of muscles. He then notes a difference in the relative development of the jaws, the lower being comparatively much shorter in the Alactagas than in the jerboas. Having described a new specis of Alactaga, a native of Barbary, under the name of Alactaga arundinis, M. F. Cuvier proceeds to consider the characters and affinities of the genera Gerbillus and Meriones, and enters into a critical examination of all the species referred to those genera, and comes to the conclusion that they have a closer affinity with the true Muridæ than with the jerboas and Alactagas. Fig. 237 represents the skull and teeth of Dipus hirtipes: *a*, skull, profile; *b*, the same seen from above; *c*, the same seen from below; *d*, *e*, the teeth.

Fig. 238 represents the skull and teeth of Alactaga; *a*, and *b*, the cranium, one-third larger than the natural size; *c*, and *d*, the teeth, five times enlarged.

239, 240, 241, 242.—The Egyptian Jerboa.

(*Dipus Ægyptius*). In the true jerboas the head is large, and not unlike that of a rabbit in form; the ears are long and somewhat pointed; the eyes are full and prominent; the tail is very long, cylindrical, and covered with short hair except at the extremity, which is tufted. The fur of the body is soft and delicate; the whiskers are long, the fore feet are very small, and have four toes and the rudiment of a thumb, furnished, however, with a nail. In the hind feet of these animals we behold palpable evidences of their express adaptation to the deserts where they habitually reside. Not only is the metatarsal portion of the foot extremely elongated, but the toes are clad on the under surface with long bristly hairs, which while they add to their span, and give firmness and security to their tread on a loose and yielding surface, defend the foot from the heat of a glowing waste beneath a fervid sun.

The Egyptian Jerboa is found in Egypt, Barbary, Nubia, and the warmer parts of Syria and Arabia. It lives in troops, which colonize the most arid parts of the desert, where, on hillocks of sand or the crumbled heaps of ruins, they work out long burrows in which to dwell. In these burrows they make their nests and rear their young. So powerful are their teeth, that they not only gnaw in a short time through the hardest wood, but, as Sonnini affirms, through thin layers of stone beneath the sand. According to some, these animals are nocturnal in their habits, stealing forth to feed and sport when evening begins to close. They are, however, not altogether nocturnal, for Sonnini observed them in broad day playing around the mouths of their subterranean habitations, and he particularly noticed that those which he kept delighted to bask in the sun, and were always lively in that situation. The jerboas are very timid creatures, and hasten to their burrows for security on the least noise: if intercepted, they trust to their speed, and seem to fly across the plain; so great indeed is the rapidity with which they bound along, that a greyhound has some difficulty in the chase. In making each leap they spring from the hind feet, the impulse being given by the powerful muscles of the thighs, while the tail serves as a balance and rudder. In the act of springing the fore paws are pressed close to the chest; they descend, however, upon them, but such is the quickness of the leap, and the celerity with which they recover their due posture, and spring again, that the eye is completely deceived, for it appears as if they never used the fore paws at all, but alike sprang from and alighted on their long slender hind legs alone. When undisturbed, their common attitude is that of sitting up on the haunches; and the fore paws are used in the same manner as in the squirrels and marmots. The food of the jerboa consists principally of bulbous roots, which the animals dig up with their fore paws; they also devour grain and other vegetable matters. It would appear that the jerboa hybernates, but the duration of its torpor cannot be very protracted.

The flesh of these animals, though unsavoury, is eaten by the Arabs and Egyptians, who contrive to capture them by stopping up all the openings of their subterranean retreat except one, which is netted.

Few animals, if we may judge from our own observations, bear confinement so impatiently as the jerboas: they sedulously exclude themselves from observation, and when they come forth from their retreat in the evening, they are restless and distrustful in the extreme.

In size this species is equal to a large rat; the general colour is pale tawny yellow, passing into a lighter tint beneath; the terminal tuft of the tail is black, merging at the tip into white; a white or whitish strip appears on each of the buttocks below the base of the tail.

243, 244.—The Dark-banded Jerboa.

Of this jerboa, which is figured by Shaw under the name of "the jerboa," we have never seen an example. It is neither noticed nor figured by Lichtenstein, who has published the best monograph of these animals that has yet appeared. For ourselves we have no doubt but that the original figure was taken from a specimen of the Egyptian Jerboa, in which the abrupt border to the white mark was darker than usual; for in some instances the back is washed with a dusky tint, which has a tendency to assume wavy transverse bands, one of which, on the haunch, as it is said, is occasionally distinct.

With regard to the Alactagas, to which we have alluded, the typical species, the Siberian Alactaga (Dipus Jaculus, Gmel.; the Alactaga, Buff.; the Siberian Jerboa, Pennant), is distributed from Arabia, through Persia, Tartary, and Turkey, and as far north as the Volga and Irtish. It inhabits the plains and flat districts, where it makes extensive burrows; in general habits it resembles the common jerboa of Egypt, but is of larger size.

Its food is stated to consist not only of vegetable but also of animal substances, as small birds and insects; and, as we learn from Pallas, it spares not even its own species. The subterranean habitations of these animals are extremely capacious, and formed about half a yard below the surface of the ground. The passage leading to them is of great length, and pursues a circuitous course, having at intervals additional shafts or openings upwards, affording extra facilities for escape in the event of danger. During the winter they hybernate; retiring to their subterranean chambers, they shut up the openings, and sink into a complete state of lethargy. It is affirmed by Gmelin that when their burrows are opened at this season a quantity of grain, dried shoots, and herbs are found within them; on the contrary, Pallas affirms that they collect no stores of provision for the winter. It is possible that both these naturalists, who had ampel opportunities of investigating the habits of the Alactaga in a state of nature, may be correct, and that in the more northern districts of its range it may accumulate a store of provision, for use in the spring, when it first rouses from its torpidity. The Alactaga is more numerous and fertile in the warmer than in the colder latitudes; but it is nowhere to be seen in such numbers as the Egyptian Jerboa. From its large size and the superior flavour of its flesh, it is more sought after, as food, than that animal, and is chased, and also taken by stratagem, by the Arabs and Tartars. Such is its swiftness that it appears to skim the plain without touching the ground; even a mounted horseman on a fleet steed can scarcely overtake it. The fur of the Alactaga is extremely soft and fine; on the upper parts it is of a pale fawn yellow, clouded with greyish brown on the lower part of the back; a white crescentic line extends on each side of the crupper, below the root of the tail. The under parts of the body and inside of the limbs are white; the tail is brown, except the tuft at the extremity, which is black tipped with white.

245.—The Labrador Jumping Mouse

(*Meriones Labradoricus*). This species appears to be the Labrador rat of Pennant; the Gerbillus Hudsonius of Rafinesque; Mus Labradorius of Sabine; Gerbillus Labradorius of Harlan; the Labrador Jumping Mouse of Godman; and Katse (the Leaper) of the Chepewyan Indians.

The genus Meriones in dental formula differs in some points from Dipus. The upper incisors, of a deep orange-colour, are marked with a longitudinal furrow; the molars are four on each side above, and three below; the first above is very small; the surfaces of the rest in both jaws are marked with irregular winding lines of enamel (see Fig. 246). The muzzle is narrow and elongated; the ears rounded, the hind limbs considerably developed; the tail long, ringed with scales, and thinly covered with short hair.

The Labrador Jumping Mouse, which was first described by Pennant in his 'Arctic Zoology,' is very common in the fur countries of North America, as far north as the Great Slave Lake, and perhaps farther; but of its habits we have no precise details.

Its general colour is brownish yellow, merging into white beneath. The length of the head and body is about five inches, that of the tail five and a half. Dr. Richardson remarks, respecting the jumping mice, of which there are, it would appear, several species, that those inhabiting different districts in America require to be compared with each other, before the true number of species, and their geographical distribution, can be ascertained.

247.—THE CAPE LEAPING HARE

(*Pedetes Capensis*, Ill. : *Helamys Capensis*, F. Cuvier). Grande Gerboise, Buffon; Spring Haas of the Dutch Colonists; Cape Jerboa, Pennant.

This curious animal, the only known example of the genus Pedetes, occupies an undeterminate situation among the Rodents; but is most probably the most nearly related to the true Jerboas, which it resembles in external appearance. The molars are four on each side, in each jaw, of simple structure, with two laminæ; the incisors are large, strong, and broad (see Fig 248). The anterior limbs are short, but very strong, furnished with five toes armed with powerful claws. The hind limbs are developed and muscular, four toed, the toes armed with long-pointed and somewhat hoof-like claws. Tail long. The leaping hare equals our common hare in size: the fur is soft, and of a dark fawn or brownish yellow, passing into white beneath; the tail is hairy, and tufted at the extremity with a pencil of black The head is large, the ears are long and pointed; and the eyes full and dark Native country, South Africa.

The leaping hare is a burrowing animal, making its holes in the soft sandy ground, which it digs up with its fore paws, spurting it backwards with its hind feet, as is done by the rabbit. In these burrows it sojourns during the day, secure from the attacks of the various carnivorous animals which infest the precincts of its retreat Night is the season of activity · it steals forth on the close of daylight to feed; and in some districts where it abounds, the depredations which it commits in the fields of grain are very serious. It proceeds in the same manner as does the jerboa, by a series of bounds: and when the animal is pursued, each bound it makes clears a space of twenty or thirty feet. It eats sitting nearly upright, and using its fore feet in the manner of a squirrel, to bring the food to the mouth It also sleeps in the same attitude, excepting that the head is bent down between the hind limbs, while the fore paws cover the eyes and ears.

The leaping hare gives preference to the sides of steep and craggy mountains, and in some places they colonize a considerable extent of ground, making it a complete warren Mr Burchell, on his second journey to Asbestos Mountain, observed their burrows in abundance. Whether this animal lays up a store of winter provision, or whether it hybernates during a part of the year, does not appear to be ascertained. but it is very certain that, in the localities it frequents, it is not only subject to a low temperature during the cold season, but that it will also experience a scarcity of its usual food.

The voice of the leaping hare is a kind of inarticulate grunt.

The Caffres esteem these creatures for food, and expel them from their burrows by pouring water into the entrances, when they issue forth and are easily taken.

249—BURTON'S GERBILLE

(*Gerbillus Burtoni*). The Gerbilles belong to the family Muridæ (and not to that of the true jerboas) The contour of the skull and the characters of the teeth are confessedly murine (see Fig 250 *a*, the skull, profile; *b*, the same seen from above, *c*, the same seen from below, *d*, *e*, teeth of the same) Though the gerbilles have the posterior limbs developed, their development is by no means to the same extent as in the jerboas; and there is a far more equal proportion between them and the anterior pair; hence these animals run as well as leap. They are active, elegant little creatures, living in burrows which they excavate to a considerable depth, and are nocturnal in their habits. F. Cuvier enumerates eight species, respectively natives of Egypt, and other parts of Africa, and India The species figured (Fig 249) has been recently described by F. Cuvier (see 'Trans. Zool. Soc.' vol ii) Of its peculiar habits we know nothing definite, but they in all probability agree with those of the Indian Gerbille, so well described by General Hardwicke in the eighth volume of the 'Linn. Trans.' The Indian Gerbille is common in Hindostan, and seems to be gregarious, great numbers associating together. "These animals are very abundant about cultivated lands, and are particularly destructive to wheat and barley crops, of which they lay up considerable hoards in spacious burrows near the scenes of their plunder. They cut the culms of the ripening corn just below the ears, and convey them thus entire to one common subterraneous repository, which when filled they carefully close, and do not open for use till supplies abroad become distant and scarce. Grain of all kinds is their favourite food, but in default of this they have recourse to the roots of grass and other vegetables About the close of day they issue from their burrows, and traverse the plains in all directions to a considerable distance. they run very fast, but oftener leap, making bounds of four or five yards at a time, carrying the tail extended in a horizontal direction When eating, they sit on their hind legs like a squirrel, holding the food between their fore feet. They never appear by day, neither do they commit depredations within doors I have observed their manners by night, in moonlight nights, taking my station on a plain, and remaining for some time with as little motion as possible I was soon surrounded by hundreds at the distance of a few yards, but on rising from my seat the whole disappeared in an instant, nor did they venture forth again for ten minutes after, and then with much caution and circumspection.

"A low tribe of Hindoos called Kunjers, whose occupation is hunting, go in quest of these animals at proper seasons to plunder their hoards of grain, and often within the space of twenty yards find as much corn in the ear as could be crammed into a common bushel They inhabit dry situations, and are often found at the distance of some miles out of the reach of water to drink. In confinement this animal soon becomes reconciled to its situation, and docile, sleeps much in the day, but when awake feeds freely at night The Hindoos above mentioned esteem them good and nutritious food"

The Indian Gerbille is of the size of a common rat, its eyes are full and black, the ears are large, rounded, and almost naked The general fur is bright bay, variegated on the back, with pencil-like strokes of dark brown, the under parts are white, the tail is cylindrical, thickly covered with short hair except at the tip, which is somewhat tufted, and of a dark brown.

251—MITCHELL'S GERBOA.

This animal, a native of Australia, and described by Mr Ogilby under the name of Dipus Mitchellii ('Linn Trans,' vol xviii), belongs, as we have every reason to believe, to the genus Hapalotis (Lichtenst, 'Saug,' pt vi 1829) It seems to take the place, on the open plains of Australia, of the jerboas and gerbilles of the deserts and plains of Africa and Asia, or of the jumping mice of North America This singular species was found on the reedy plains near the junction of the Murray and Murrumbidgee, on the northern boundaries of Australia Felix The cut is taken from the figure in Sir T. Mitchell's account of 'Three Expeditions into the Interior of Eastern Australia' Sir T. Mitchell states that the fore and hind legs of this animal resemble in proportion those of a kangaroo, and it used the latter by leaping on its hind-quarters in the same manner It was not much larger than a common field mouse, but the tail was longer in proportion than even that of a kangaroo, and terminated in a hairy brush about two inches long We may here remark that the genus Hapalotis is the same as Conilurus, Ogilby ('Linn Trans,' xviii pt i. p 121 1838), and must be retained, according to the law of priority

252, 253—THE COMMON MOUSE

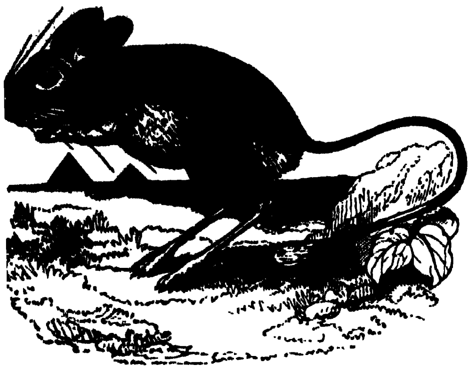
(*Mus Musculus*) The genus Mus, which includes the true rats and mice is typical of the extensive family Muridæ The characters of this genus may be thus summed up incisors of the usual number, those of the lower jaw compressed and pointed, molars on each side, both above and below, three, with true roots, and a transversely tuberculated surface, the ridges varying in number in each tooth, the anterior molar is the largest, the posterior the smallest. (See Fig 254) The muzzle is elongated and sharp; the ears are oblong or rounded, and almost naked. The toes of the anterior feet are four, with the minute rudiment of a thumb, those of the hind feet are five. The limbs are short, the tail is long cylindrical, tapering, and annulated with scales of epidermis, from between which emerge short hairs, forming a scanty covering. The fur is soft, but traversed by long outer hairs of a stiffer quality than those composing the under-coat. All these animals are of small size, yet many are among the greatest pests to man. Although vegetable aliment, as grain, peas, &c., forms their principal food, still, to a certain extent, they are carnivorous. We know the partiality of the mouse to cheese, butter, lard, tallow, &c., and of the brown rat to raw flesh. The stronger and larger species often prey upon the smaller, and in times of scarcity they will attack and devour each other. All are nocturnal, and most, if not all, subterranean in their habits, and also gregarious. Some frequent the fields and woods, some the gardens, and some the abodes of man, undermining floors and walls, and breeding within the precincts of his habitation. They are spread through every quarter of the globe; and the common mouse and the brown rat have been introduced by the indirect agency of man, even into the remotest and most desolate islands. (See 'Zoology of the Voyage of H.M.S. Beagle—Mammalia,' No ii. of pt. ii., p. 31, et seq.) With respect to the brown rat (Mus decumanus), sometimes erroneously called the Norway rat, it appears to have been originally transported from Persia or India into Europe; its place was previously occupied by the black rat (Mus rattus), a smaller and more timid animal, and in some districts now quite extirpated by its more powerful rival. The brown rat was not known in England before 1730, nor in France before 1750 According to Pallas, it did not appear in Russia and Siberia till 1766; and Dr. Harlan states that it did not make its appearance in North America till 1775. When Dr. Richardson wrote his 'Fauna Boreali-Americana,' it was common in Lower Canada, but had not advanced much beyond Kingston in Upper Canada. He did not observe it in the fur countries, and believes, if it exists there, that it is only at the mouth of the Columbia river or at the factories on the shores of Hudson's Bay. Mr Darwin found it at Buenos Ayres, Valparaiso, East Falkland Island, and Keeling Island With respect to the black rat, even that is in all probability of foreign origin It was not known in Western Europe before the middle of the sixteenth century, and Gesner was the first who described and figured it

In the island of Ascension in the Atlantic Ocean Mr Darwin found two varieties, as he and Mr Waterhouse consider, of the black rat (Mus rattus) These two animals differ in the colour of the fur, one being of a grizzled brownish colour, the other black, with more soft or glossy fur. "The specimen which has a black and glossy fur frequents the short coarse grass near the summit of the island, where the common mouse likewise occurs. It is often seen running about by day, and was found in numbers when the island was first colonized by the English a few years since The other and browner coloured variety lives in the outhouses near the sea beach, and feeds chiefly on the offal of the turtles slaughtered for the daily food of the inhabitants If the settlement were destroyed, I feel no doubt that this latter variety would be compelled to migrate from the coast Did it originally descend from the summit? and in the case first supposed would it retreat there? and if so, would its black colour return? It must, however, be observed that the two localities are separated from each other by a space, some miles in width, of bare lava and ashes. Does the summit of Ascension, an island so immensely remote from any continent, and the summit itself surrounded by a broad fringe of desert volcanic soil, possess a small quadruped peculiar to itself? or, more probably, has this new species been brought by some ship from some unknown quarter of the world? Or, I am again tempted to ask, as I did in the case of the Galapagos rat, has the common English species been changed by its new habitation into a strongly marked variety?—D." ('Zool of Voyage of Beagle p 36)

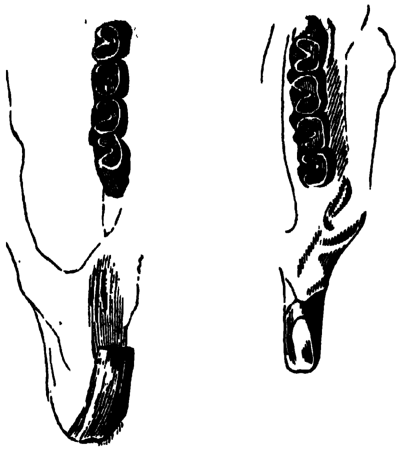
This zoological problem is one of the many so difficult to solve Mr Waterhouse remarks, "It appears as if the brown and black rats (M decumanus and M rattus), and likewise the common mouse all of which follow man in his peregrinations, and which to a certain degree are dependent upon man and may be therefore termed semi-domestic animals, are, like really domestic animals, subject to a greater degree of variation than those species which hold themselves aloof from him" (Ibid)

The common mouse is undoubtedly indigenous in Europe, and has been known from the earliest times, it is the Anglo-Saxon Mus, the German Maus, the Danish Muys, the Latin Mus, and the Greek Μῦς. In Spanish its name is Rat, in Portuguese Ratinho, in Italian it is called Sorice, and in French Souris· from the Latin Sorex, employed by zoologists to designate the Shrews.

This elegant but troublesome little animal needs no description; all are well acquainted with it. "Domestic in its habits," says Mr Bell, "nourished by almost every article of human food, and finding effectual shelter in the secret recesses of the habitations which human art has raised, it has accompanied man in all his adventures for colonization, and identified itself with every new territorial occupation of our race" The mouse is easily tamed, and it is interesting to observe it sitting up holding its food between its paws, or cleansing with them the sides of its face and the back of its ears, its black eyes glistening with animation. An Albino variety (white, with red eyes) is not uncommon (Fig 253), and often kept in cages for the sake of its beauty. It breeds freely in captivity, perpetuating a white race, which, born and bred in captivity, are



241.—Egyptian Jerboa.



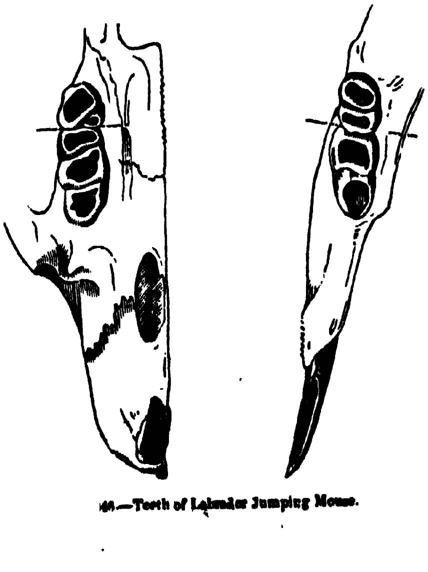
248.—Teeth of Cape Leaping Hare

242.—Egyptian Jerboa.

243. —Dark-banded Jerboa.

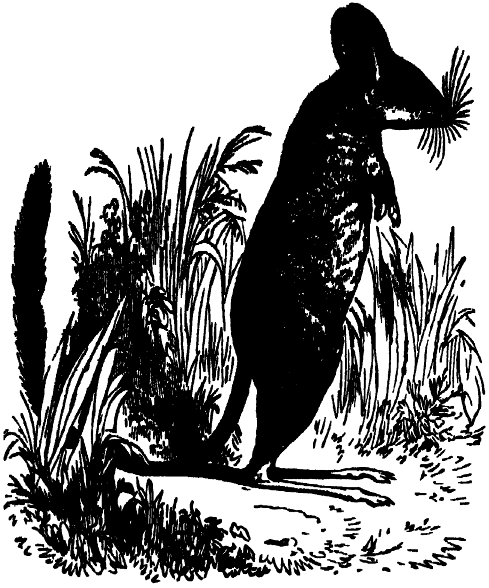
247.—Cape Le

245.—Labrador Jumping-Mouse.

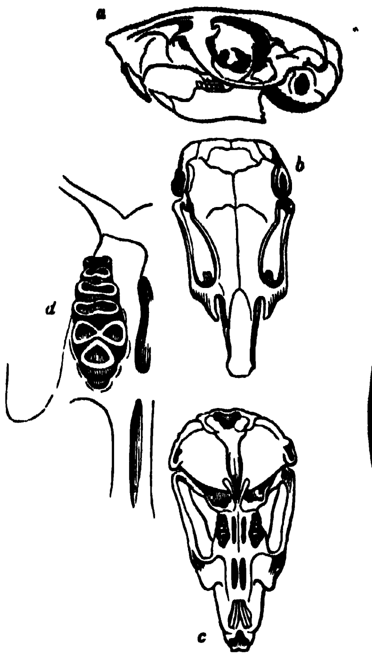


46.—Teeth of Labrador Jumping Mouse.

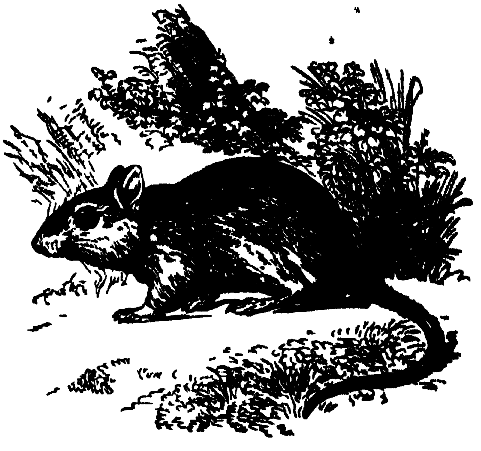
244.—Dark-banded Jerboa.



251 —Mitchell s Jerboa.

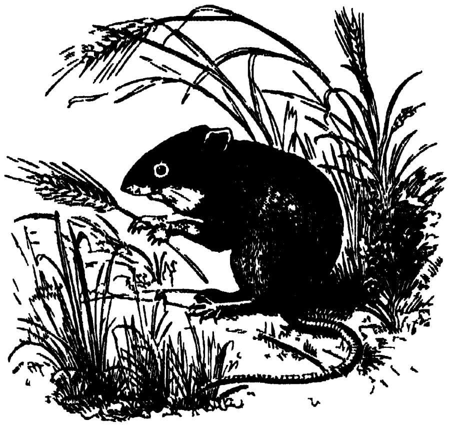


0 —Skull and Teeth of Burton s

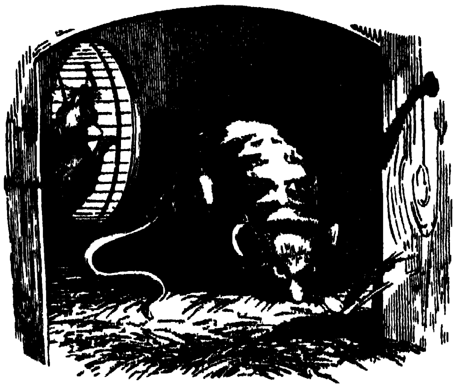


249 —Burton s Gerbille

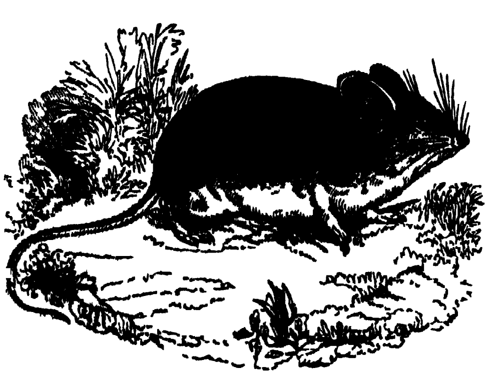
252 —Common Mouse



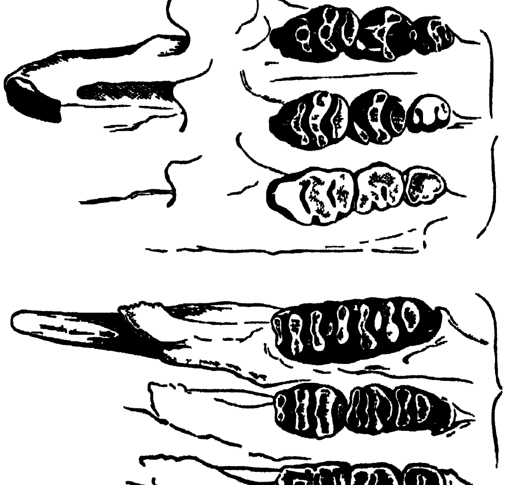
257 —Long-tailed Field Mouse



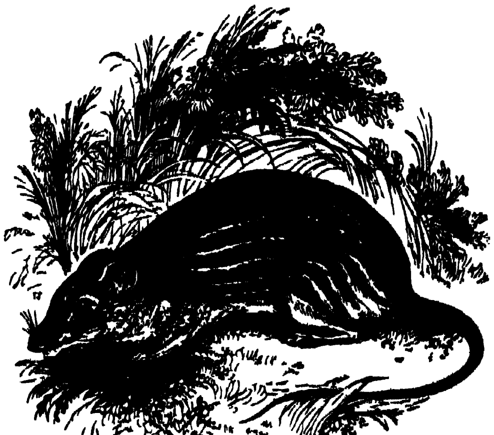
253 —Common Mouse



256 —Darwin's Mouse



254.—Teeth of Common Mouse.



255.—Barbary Mouse.

gentle and familiar, and when allowed to run about a room never attempt to escape.

The common mouse produces young to the number of 5 or 6, several times during the course of the year. In about a fortnight they leave the mother, and obtain their living independently.

To this species Mr. Waterhouse (see 'Zool. of Beagle') refers six specimens in Mr. Darwin's collection: "Two were found living in the short grass near the summit of the island of Ascension, where the climate is temperate. Two others were procured on a small stony and arid island, near Porto Praya, the capital of St. Jago, in the Cape de Verde Islands, where the climate is very hot and dry. Excepting during the rainy season these little animals can never taste fresh water, nor does the island afford any succulent plant. A specimen was also procured on a grassy cliff on East Falkland island, at the distance of a mile from any habitation. It is singular that so delicate an animal should be able to subsist under the cold and extremely humid climate of the Falkland Islands and on its unproductive soil.—D." It must be observed that all these specimens are rather less than full-grown individuals of the same species procured in England: in other respects they do not differ.

The sixth specimen is from Maldonado, where it is common in the houses of the town, and is similar in habits to its European relative. The Maldonado mouse is considerably less than British specimens of the common mouse, and is of a richer and brighter colour; the head is smaller, the muzzle shorter in proportion, whilst the tarsi are even longer than in a large specimen of Mus musculus. These points of dissimilarity induced Mr. Waterhouse to regard it as a distinct species, and to apply to it the name of 'brevirostris.' But upon subsequent re-examination, he was induced to change his opinion. The teeth indicate that it is not an adult specimen.

Mr. Darwin ('Journal and Remarks') observes that mice and other small Rodents subsist in considerable numbers in very desert places, as long as there is the least vegetation. In Patagonia, even on the borders of the Salinas, where a drop of fresh water can never be found, they swarm. Next to lizards, he adds, mice appear to be able to support existence on the smallest and driest portion of the earth, even on the islets in the midst of great oceans. He believes it will be found that several islands, which possess no other warm-blooded quadruped, have small Rodents peculiar to themselves. Sir Woodbine Parish ('Buenos Ayres,' &c.) states, that after the great drought of 1830, 1831, and 1832, there was a prodigious increase of all kinds of vermin, especially field-mice, myriads of which overran the country, and entirely destroyed the maize-harvest of 1833.

255.—The Barbary Mouse

(*Mus Barbarus*). In size this beautiful species is intermediate between the common mouse and rat. It is found in Barbary, where the natives term it Phār Azeph, the Palmetto mouse. Some time ago three individuals were living in the Vivarium of the Zool. Soc. Lond.; and were described and figured by Mr. Bennett, who may be said to have really introduced this species to science: for, since the time of Linnæus, who first described the animal in the addenda to the twelfth edition (the last published by himself) of his 'Systema Naturæ,' no naturalist appears to have seen it. So completely, indeed, had it escaped the researches of later zoologists, that M. Desmarest ventured to suggest a doubt of its existence.

"The ground-colour of the Barbary mouse is dark brown, marked on each side with five or six yellowish stripes, about half as broad as the intervening spaces, extending along the whole length of the body, and becoming confused towards the under parts, which are nearly white. On the fore feet only three of the toes are at first visible, and this circumstance, mentioned in the specific character given by Linnæus, has led many subsequent naturalists to doubt whether the Barbary mouse really belongs to the genus with which it was associated. Linnæus himself had, however, stated in his description of the species, that rudiments of a thumb, and also of a fifth toe, were observable on a closer inspection; and this statement has been fully confirmed by an examination of the specimens in the Zool. Gardens." ('Gardens and Menagerie delineated,' p. 31.)

Of the native habits and manners of the Barbary mouse we have no definite information. Those in confinement, to which we have alluded, resembled the rat in actions and disposition. Their carnivorous propensities indeed were amply evinced on the death of one of their number, by the two survivors having commenced devouring the body.

It may be observed that the specimens examined by Linnæus were very young, for he describes them as being smaller than the common mouse.

A beautiful striped mouse, termed the Cape striped mouse (Mus pumilio), is peculiar to the districts of the Cape of Good Hope. It was first described by Sparrman, who gives a figure of it in his 'Travels in Africa,' taken from a young individual. The general colour is brownish grey, with four black stripes along the back; the upper surface of the head is black. Another species, the Indian striped mouse (Mus striatus), of which a few years since little was known, may also be noticed. Specimens of this animal have been kept alive in the Vivarium of the Zool. Soc. The general colour is grey with a tinge of reddish or yellow, and the back is marked with a dozen longitudinal rows of small white spots distinct from each other, forming so many interrupted stripes; the under parts are whitish.

256.—Darwin's Mouse

(*Mus Darwinii*). Among the numerous small Rodents belonging to the family Muridæ collected by Mr. Darwin (see 'Zool. of H.M.S. Beagle'), is a small group, the species of which, Mr. Waterhouse observes, though very closely allied to the genus Mus, offer some slight modification not only in their external form, but also in the structure of the teeth. "They have the fur soft and silky; the head large; and the fore-legs very small and delicate; the tarsus moderately long, and bare beneath. In the number and proportion of their toes they agree with the true rats; the tail is moderately long, and more thickly clothed with hair than in the typical rats. The ears are large and clothed with hair. Like the true rats, they have twelve rooted molars; the folds of enamel however, penetrate more deeply into the body of each tooth, and enter in such a way that the crowns of the teeth are divided into transverse and somewhat lozenge-shaped lobes of a triangular form. In the front molar of the upper jaw the enamel enters the body of the tooth twice, both in the outer and inner sides; and in the second and posterior molars, both of the upper and under jaws, the enamel penetrates but once externally and internally in each. In the front molar of the lower jaw the enamel enters the body of the tooth three times internally and twice externally" ('Proc. Zool. Soc.,' 1837, p. 27). These Murine animals Mr. Waterhouse regards as constituting a sub-genus for which he proposes the name of Phyllotis. Darwin's mouse, Mus (Phyllotis) Darwinii, was found in dry and stony places at Coquimbo in Chile. The fur above consists of cinnamon-coloured and blackish hairs intermixed; the space before the eyes is of a greyish tint; the sides of the face and body are of a pale cinnamon colour; the under parts and limbs white; the ears are large: the tail as long as the head and body; brownish above, white beneath. Length of head and body six inches.

Besides the sub-genus Phyllotis, Mr. Waterhouse characterizes the following as sub-generic sections of the genus Mus, all peculiar to South America, and of which specimens were collected by C. Darwin, Esq., at various localities, viz., Coquimbo, Valparaiso, Port Desire, Maldonado, Bahia Blanca, &c.: Scapteromys, Oxymycterus, Abrothrix, Calomys, Reithrodon, and Acracoma. ('Proc. Zool. Soc.' 1837.) The two latter, indeed, he considers as valid genera.

In North America there are two interesting genera of the Muridæ, which may here be noticed, namely, Neotoma and Sigmodon, both established by Say and Ord in the 'Journal of the Acad. Nat. Soc.,' Philadelphia. To the first genus belongs the Florida rat (Neotoma Floridana), larger than the ordinary rat, with soft velvety fur of a lead colour, with yellowish and black hairs intermixed. The specimen described by Say and Ord was discovered in a log granary situated in a ruined and deserted plantation in East Florida. "When first aroused it ran a short distance, then returned, and stood close by us, allowing us to touch it with a gun before it again retreated. It was mild, or without that suspicious and cunning air so remarkable in the common brown rat. We have reason to think that the species is not uncommon in Florida, as several individuals were seen by Mr. Say, in an old mansion, but he was unprovided with the means of capturing them." Specimens are preserved in the Museum of the Zool. Soc. A second species was discovered by Mr. Drummond in the Rocky Mountains, and is described by Dr. Richardson under the title of N. Drummondii. This animal "makes its nest in the crevices of high rocks, and seldom appears in the daytime. Its food most probably consists of herbage of various kinds, and of small branches of pine-trees, because there is generally a considerable store of those substances laid up in the vicinity of its residence. It is very destructive. In the course of a single night the fur traders who have encamped in a place frequented by these animals have sustained much loss by their packs of furs being gnawed, the blankets cut in pieces, and many small articles carried entirely away. Mr. Drummond placed a stout pair of English shoes on the shelf of a rock, and as he thought in perfect security, but on his return after an absence of a few days he found them gnawed into fragments as fine as saw-dust. This species is nine inches in the length of the head and body, its tail being seven and a half inches. Its general colour is yellowish brown above, and white beneath: the fur is full and soft, and the tail is bushy and densely hairy, instead of being round, tapering, and thinly covered with hair, as in the Florida rat. (Specimen in Museum of Zool. Soc.) With respect to the genus Sigmodon, the dentition of which is characterized by the flexures which the folds of enamel on the molar teeth present, one species only is described, viz., the Rough-haired Sigmodon (S. hispidum). This animal is very numerous in the deserted plantations lying on the river St. John in East Florida, particularly in the gardens. Its burrows are seen in every direction. Emigrants to that section of the country will find the species a great pest to rural economy. General colour, pale dirty ochre mixed with black; under surface, ashy grey. Length of head and body, six inches; of the tail, four inches. (Specimen in Museum of Zool. Soc.) Closely allied to the genus Neotoma is a species termed the white-footed mouse (Mus leucopus), found in California, and on the borders of the Columbia river. The habits of this elegant little creature are well described by Dr. Richardson, who observed it as far north as the Great Bear Lake. "The gait and actions of this little animal are so much like those of the English domestic mouse, that most of the Europeans resident at Hudson's Bay have considered it to be the same species, although overlooking the obvious differences of their tails and other peculiarities. This American mouse, however, has a habit of making hoards of grain or little pieces of fat, which I believe is unknown of the European domestic mouse; and what is more singular, these hoards are not formed in the animals' retreats, but generally in a shoe left at the bedside, the pocket of a coat, a nightcap, a bag hung against the wall, or some similar place. It not unfrequently happened that we found barley which had been brought from a distant apartment, and introduced into a drawer, through so small a chink, that it was impossible for the mouse to gain access to its store. The quantity laid up in a single night, nearly equalling the bulk of a mouse, renders it probable that several individuals unite their efforts to form it. This mouse does considerable mischief in gardens, and in a very few nights will almost destroy a plantation of maize, by tracing the rows for the purpose of collecting the seeds, and depositing them in small heaps under the loose mould, generally by the side of a stone or piece of wood. From the facility with which it seems to transport the substances it preys upon, I suspected that it had cheek-pouches, but none were found on examination. The ermine is a most inveterate enemy to this species, and pursues it even into the sleeping apartments of houses." The colour above is fine dark brown; the under part and feet are white. (Specimens in Museum of Zool. Soc.)

257.—The Long-tailed Field-Mouse

(*Mus sylvaticus*). Eyes full, black, and bright;—colour above reddish brown, beneath whitish; ears more than half the length of the head; tail somewhat shorter than the head and body. Length of head and body three inches eight lines. It is Le Mulot of Buffon.

This beautiful but mischievous little animal is spread over the whole of temperate Europe. It frequents woods, plantations, parks, orchards, and gardens, where it commits great devastations. In some places it multiplies in hosts, and instances are on record of young plantations covering acres having been totally destroyed by their depredations. They strip the bark and shoots from off the sapling trees, and root up the newly-planted acorns; nor are they less injurious in wheat fields. Each individual lays up in its hole or burrow a winter store of food, consisting of grain, acorns, nuts, peas, &c.; and hence it is not only from what they devour at the time, but also from what they carry away that they cause such injuries. In the kitchen-garden, as we can personally testify, they are not a little annoying, digging up peas and beans when newly sown or when beginning to germinate. One of their natural enemies, and one of the most efficient agents in their destruction, is the short-eared owl (Otis Ulula). Latham informs us that in certain districts which have been infested with these mice the "owls have collected in large troops, and attacked the depredators to their utter extermination." It is not exclusively to vegetable matters that these mice confine their diet; young birds become their prey, and when food is scarce they will attack each other, the younger or weaker falling victims to the more powerful.

The field-mouse, though extremely timid, is easily tamed and rendered familiar, and its manners are very engaging. It is free from the unpleasant odour which renders the common mouse a nuisance, The field-mouse breeds twice in the year, producing from six to ten young at a time. It is easy therefore, to calculate the rapidity of its multiplication, and to account for the sudden appearance of swarms in spots where few had been previously observed. Buffon states that by means of a single trap two thousand three hundred were killed in twenty-three days in a single field of about forty acres in extent. In some parts of our own country their numbers have been incalculable and their devastations frightful.

258, 259.—The Harvest-Mouse

(***Mus Messorius***). Of all our British mammalia the harvest-mouse is the smallest. This beautiful little species was first discovered in our island by Gilbert White, and described in his 'Natural History of Selborne.' Yet it is by no means uncommon in the corn counties, and especially in Hampshire, though so long overlooked by British naturalists. It is found in Wiltshire, Gloucestershire, Devonshire, and Cambridgeshire, and occurs in France, Germany, Russia, and Siberia. It is the Mulot nain and Rat de moissons of F. Cuvier; the Mus minutus of Pallas, and the Mus Pendulinus of Hermann.

The harvest-mouse is a lively, active, playful little creature; its eyes are dark: its general colour above is delicate reddish fawn; the under parts are abruptly white: the ears are short and rounded; the tail is rather shorter than the body. Length of head and body two inches six lines.

This animal lives entirely in the fields, resorting in the winter to burrows of its own construction, or to corn-ricks, into which it penetrates, and there finds food and shelter. The asylum in which it rears its young is an artful and beautiful nest of a spherical figure, consisting of the split leaves and panicles of grasses artificially interwoven together, and suspended among the stalks of standing corn, or thistles, or other plants, to which it is secured, and of which the leaves will shroud it from notice.

According to Dr. Gloger, the entrance to the nest is rather below the middle, on the side opposite to the stems, and is scarcely observable; the parent closes it when she leaves the nest, and probably while she remains herself within. The inside is warm, smooth, and neatly rounded. One nest examined by Dr. Gloger contained five young, another nine.

It would appear that the harvest-mouse is insectivorous as well as granivorous, and this fact was first noticed by the Rev. W. Bingley, who obtained a female, which after its capture produced eight young, but being disturbed by a conveyance of several miles, she killed them, as the rabbit is frequently known to do. "One evening," he observes, "as I was sitting at my writing-desk, and the animal was playing about in the open part of its cage, a large blue fly happened to buzz against the wires; the little creature, although at twice or thrice the distance of her own length from it, sprang along the wires with the greatest agility, and would certainly have seized it had the space between the wires been sufficiently wide to have admitted her teeth or paws to reach it. I was surprised at this occurrence, as I had been led to believe that the harvest-mouse was merely a granivorous animal. I caught the fly, and made it buzz in my fingers against the wires. The mouse, though usually shy and timid, immediately came out of her hiding-place, and running to the spot seized and devoured it. From this time I fed her with insects whenever I could get them, and she always preferred them to every other kind of food that I offered her." The same writer observed that the tip of the tail possessed a prehensile power, and that the animal used it while climbing about the wires of its cage. We have seen the harvest-mouse in captivity tolerably tame, and reconciled to its prison. It often sits erect, and feeds itself, holding grain between its paws, which it also uses in dressing its soft fur. It drinks by lapping the water with its tongue, and sleeps rolled up into a ball.

260.—The Hamster

(***Cricetus vulgaris***). Fortunately for England, the hamster is not indigenous within the precincts of the island. It inhabits the whole tract of countries extending between the Rhine and the Ural mountains, and between the German Sea and Baltic to the north and the Danube to the south, wherever it finds a congenial soil. It is very common in Thuringia. Its proper soil is a deep alluvial mould with a substratum of clay; in dry, strong-soiled, or stony districts, it is not often found. The teeth of the hamster closely resemble those of the rat. (Fig. 261.) The tail is short and hairy. There are large cheek-pouches, as in some of the monkeys, in the form of sacks, which serve for carrying home food; they extend from the inside of the cheeks beneath the skin, along the sides of the neck, even over the shoulders. The general figure is thick: the limbs are short; there are four toes and a small thumb on the anterior feet; five toes on the hind feet; the head is large, the muzzle abruptly pointed, the ears rounded. The general colour is as follows: head and upper parts reddish grey, verging to yellow on the face; under parts black, with the exception of the throat and feet, which are white. Three large distinct spots of white are also disposed on each side, one on the cheeks, one on the shoulder, and one on the ribs. Black varieties are not unfrequent; in these the nose and feet are white. There are two oblong spaces on the skin, situated one on each side of the spine, at a short distance in front of the thighs, which, instead of having the usual fur, are covered with short, brown, stiff hairs. These patches, which are about an inch long, are not always directly perceptible, being obscured by the surrounding long fur, which must be blown aside to show them. The adult male measures from nine to twelve inches, exclusive of the tail, which is about three inches long. The weight is sometimes more than a pound. The female is smaller by one-fourth.

The hamster is nocturnal in its habits: during the day it lies rolled up in its burrow: at night it issues forth to ramble in quest of food; after midnight it returns to its burrow and rests till about an hour before sunrise, when it takes a second ramble till the morning fairly dawns. Its movements are slow and creeping: it often utters short growling tones, but when irritated its voice is a shrill yelling cry. In collecting food, as beans, peas, wheat, &c., it uses its paws to press the grain backwards to the bottom of the pouches, in order to make room for the entrance of more. When these are well filled, it returns to its burrow to unload them, in which act it again uses its paws. In summer it feeds upon green fodder and the leaves of many plants; but the hamster is also carnivorous, attacking and devouring rats, mice, birds, lizards, insects and their larvæ, and the weaker of their own species. Even the two sexes live in harmony only during the few days of each breeding season. The hamster fights obstinately, and will jump with equal fury at a waggon-wheel or at a horse if he tread near it; and when two rival males meet, they engage in a desperate conflict till one retreats or perishes. In these paroxysms of fury the cheek-pouches become distended with air, the animal at the same time blowing and uttering at intervals its shrill cry.

In the construction of its burrows the hamster displays great ingenuity. They are in some respects modified according to age, sex, and soil; for each individual has its own exclusive burrow. Each burrow has at least two openings; one descends obliquely, the other perpendicularly. The former is termed the "creeping-hole," and this is excavated from without,—but the perpendicular passage, termed the "plunging-hole," is worked out from one of the chambers, that is, from within the subterranean domicile, and is often four feet deep. The distance of these two holes from each other varies from four to ten feet, and between the termination of these two passages are the chambers. The creeping-hole is not in such constant use as the other, and in an inhabited burrow it is regularly found stopped with earth at the distance of about a foot from the mouth. The chambers are more or less oval, and of large size; that nearest the creeping-hole is the smallest, and is well lined with a bed of soft fine straw: it has three openings, one into the creeping-passage, one into the plunging-passage, and one communicating with the store-chambers, of which there are several, at least in the burrows of the old male. Each chamber is filled in the autumn with provisions, and sixty-five pounds of corn or a hundredweight of horse-beans have been found in the magazines of a single hamster. The burrow of a female has from three or four to eight plunging-holes, all terminating in her nest-chamber. Here she produces her litter, from six to eighteen in number. The young are born blind and naked, but in eight or nine days their eyes are opened; they grow rapidly, and in about a fortnight begin to dig small burrows, each making its own. The female has several litters in the course of a year. About the middle of October the hamster retires for good to its retreat, stopping up first the creeping-holes, then the plunging-holes;—after this the animal keeps awake (though underground) for about two months, living on its store and becoming very fat. When the cold of winter has fairly set in and reached it, it sinks into a complete state of torpor, which continues till the middle of February. About the middle of March it begins to open its passage, and re-visits the fields; it now abandons its old burrow, and begins to form a fresh one. The flesh of the hamster is said to be very good; the fur is also esteemed, and the hamster-hunter, who trades in the skins, usually opens the burrows after the corn has been reaped, for the sake of obtaining the grain which the hamster has accumulated.

262.—The Caffre Broad-eared Rat

(*Euryotis unisulcatus*.) This species of rat is a native of South Africa, whence it was brought by M. Delalande. It forms the type of the genus Euryotis of Brands, to which title that of Otomys, proposed by F. Cuvier, must give place. Dr. A. Smith has appropriated the term Otomys to another group of Rodents. In its dentition (Fig. 263) this animal closely approximates to the true rats, as also in general form and structure: the eyes are large; the ears are ample and broad, and furnished with an internal projecting membrane, which when its edges are approximated entirely shuts the entrance of the auditory opening. The fur is thick and soft, and the general tone of colouring is a clouded yellow tint, becoming yellowish white on the under parts. Length of head and body about six and a half inches; of tail, nearly three inches. Of the habits and manners of this animal we have no definite information.

264.—The Hydromys

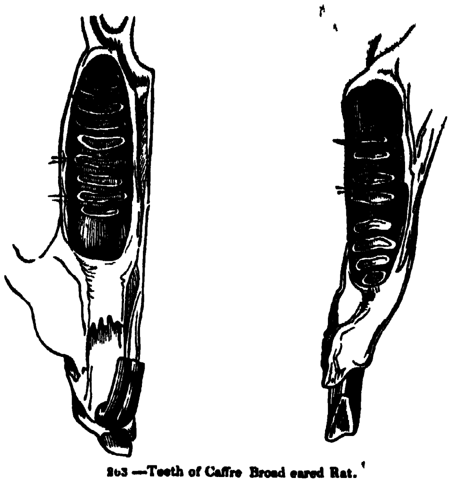
(*Hydromys leucogaster* and *chrysogaster*). Though we refer the genus Hydromys to the Muridæ, it differs in dentition from the other members of that family. There are only two molars on each side above and below; the first above is three times the size of the second, and is composed of three irregular portions, each portion being depressed in its centre, which is surrounded by a ridge of enamel; the second molar is composed of two unequal parts: the first molar below is twice the size of the second, and both are composed of two parts. (See Fig. 265.) The Hydromys is an aquatic animal, and well adapted for swimming: the head is flat; the body otter-like, elongated, and covered with close glossy fur: on the fore feet there are four toes and the rudiment of a thumb; on the hind feet there are five toes united by webs. The tail is long and cylindrical, covered with close stiff hairs; the ears are short and rounded; the upper surface is brown, the extremity of the tail for about a third of its length white; the under surface varies from white to a fine deep orange-yellow. Some writers have regarded these varieties as distinct species;—we have seen specimens with the colour of the under surface in intermediate stages between white and yellow. Length of head and body, about twelve inches; that of the tail nearly as much. The Hydromys is a native of Van Diemen's Land, and various small islands in D'Entrecasteaux Channel; but of its habits we have no detailed accounts.

The family Arvicolidæ.—In this family are comprehended the Water-rat, the Lemming, and other Rodents, termed Campagnols, Voles, &c., distinguished from the Muridæ by having rootless molars, by having the angle of the lower jaw raised, and by certain peculiarities in the structure of the cranium.

266.—The Economist Mouse

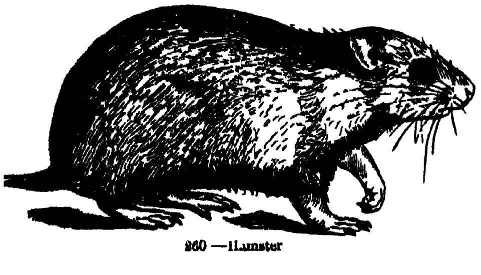
(*Arvicola œconomus*). In the genus Arvicola the molars are $\frac{3-3}{3-3}$ composite with flat crowns, presenting angular enamelled laminæ (Fig. 267). The ears are moderate, the muzzle obtuse, the tail shorter than the body, and hairy. The Economist mouse is a native of the northern sweep of Siberia and Kamptschatka. It would appear that the same or a closely allied species inhabits Iceland. It is a burrowing animal, and constructs beneath the turf narrow galleries which lead to a chamber, in the form of an oven, communicating with another used as a magazine, in which it stores up food for winter consumption. This consists of bulbous roots, and various grains and berries; and the quantity of provision amassed is often very considerable. These animals breed several times in the year, producing three or four at a birth. Like the lemming, from some unknown cause, these mice, at irregular periods, but always in the spring, perform extensive migrations. Multitudes assemble together, forming an army myriads strong. In Kamptschatka their progress is westward; neither rivers, nor lakes, nor even arms of the sea stop them: thousands are drowned or destroyed by birds and beasts of prey,—but onwards the army marches,—pursuing their course, until they have crossed the river Penshim, when they bend their way towards Judoma, and Ochot, which they usually reach about July: they return to Kamptschatka in October, but sadly reduced in numbers by the accidents of flood and field. According to Dr. Henderson, the Economist mouse of Iceland displays great sagacity in conveying home and stocking its provisions; and he corroborates the account of MM. Olafsen and Povelson respecting their mode of conveying them across such streams as they may meet with in their foraging expeditions. "The party, which consists of from six to ten, select a flat piece of dried cow-dung, on which they place the berries in a heap in the middle; then by their united force they bring it to the water's edge, and, after launching it, em-

258.—Harvest Mouse



263.—Teeth of Caffre Broad eared Rat.

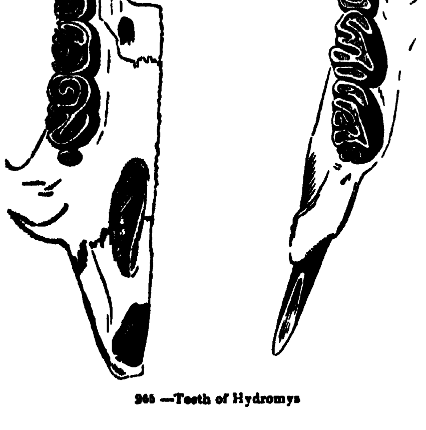
259.—Harvest Mouse



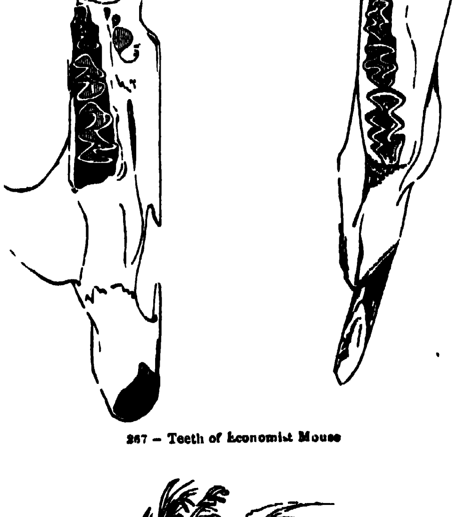
260.—Hamster

266.—Economist Mice

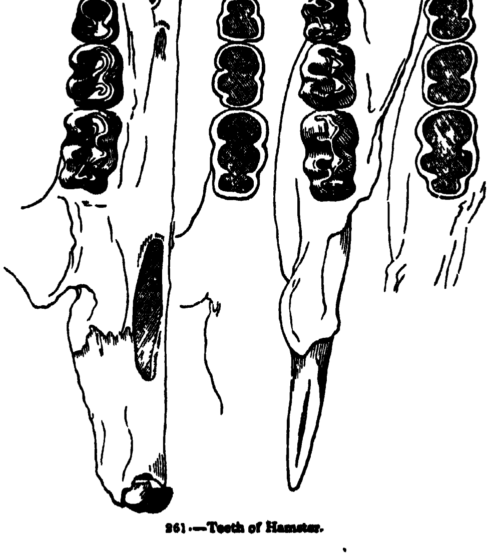
264.—Hydromys.



265.—Teeth of Hydromys



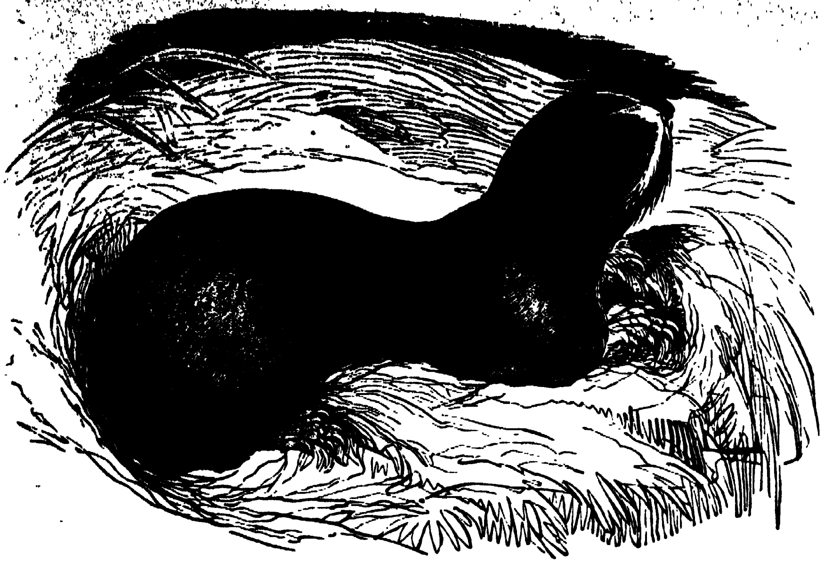
267.—Teeth of Economist Mouse



261.—Teeth of Hamster.

268.—Water-Rat.

262.—Caffre Broad-eared Rat.

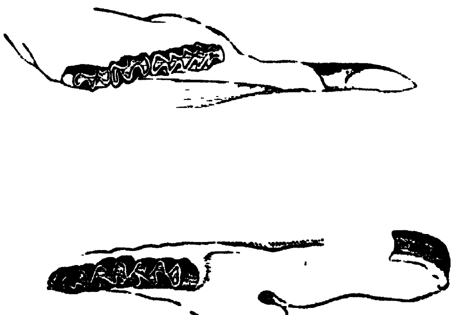


272.—Mole-Rat.

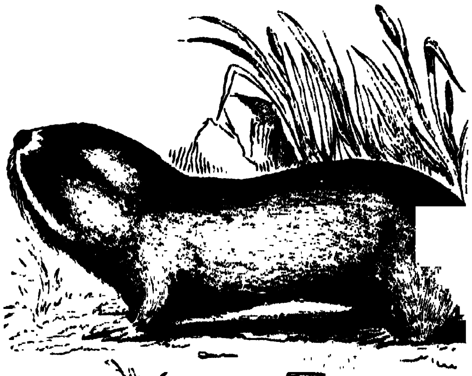
274.—Canada Sand-Rat.

269.—Beavers.

271.—Musquash.



271*.—Teeth of Musquash.



bark and place themselves round the heap with their heads joined over it, and their backs to the water, their tails pendent in the stream serving the purpose of rudders." (Fig. 266.) The truth of this fact he says was confirmed by the testimony of two credible witnesses, the clergyman of Briâmslœk, and Madame Benedictson, of Stickesholm. He further states that they make a drainage from their burrow, leading into a deep hole, intended for the reception of the water.

268.—The Water-Rat

(*Arvicola amphibia*). Rat d'eau, Buff. The water-rat is by many regarded as a variety of that destructive animal the common rat, which, as is well known, often takes up its quarters in drains and ditches, and the banks of canals, especially near houses, farms, stables, &c., making deep burrows in which to rear its young. From this pest the water-rat is totally distinct. It frequents the borders of large ponds, reservoirs, streams, and rivers, dwelling in burrows of considerable extent to which there are generally two or more outlets. The main outlet is in most instances close to the water's edge, so that during floods it is not unfrequently below the surface, but the gallery, sloping upwards as it proceeds in the bank, terminates in a chamber which the water does not reach. Here, in a snug bed of dried grass and vegetable fibres, the female rears her young. Nocturnal or crepuscular in its habits, it is chiefly as the dusk of evening steals on that the water-rat emerges from its retreat, but it seldom ventures far from the margin of the pond or river, into which when alarmed it immediately plunges, and swims under the cover of overhanging roots and herbage to its burrow. Though not web-footed, it is at home in the water, and dives with great ease. There are few persons who have not noticed its waymarks on the surface of stagnant ponds, or ditches mantled over with a thick crop of chickweed. These tracts are made during the night, the season in which it wanders in search of food or its fellows. The roots of aquatic plants, especially the typha, the stems of equisetum, buds and bark, &c., constitute the diet of this species: it has been affirmed that it feeds also upon insects, small fishes, frogs, &c., but for this assertion there is not the slightest foundation. It would appear that the water-rat hybernates during some portion of the winter, and also lays up a store of food. Mr. White says, "As a neighbour was lately ploughing in a dry chalky field, far removed from any water, he turned out a water-rat that was curiously laid up in an hybernaculum artificially formed of grass and leaves. At one end of the burrow lay above a gallon of potatoes regularly stowed, on which it was to have supported itself for the winter." It must be acknowledged that there are some points in the history of this species to be cleared up. In size this animal equals the common brown rat, but the head is thicker and more obtuse, the muzzle being blunt and short; the ears are scarcely apparent, being buried in the fur; the eyes are small and black; the tail is little more than half the length of the body, and thinly covered with short hairs. The fur is thick and close; its colour on the upper parts is dark reddish brown, mixed with grey; on the under surface brownish white: a black variety sometimes occurs. The species is spread over most parts of Europe.

269, 270.—The Beaver

(*Castor Fiber*). The Beaver is not exclusively confined to the northern portions of the American continent. Herman (see 'Journey round the Earth,' &c.) informs us that it "abounds in the Obi, and is taken, not for the sake of its fur, but for its musk, which bears a very high price." It is common along the Euphrates, and a skin sent home by Col. Chesney is in the possession of the Zool. Soc. Lond. The beaver occurs also along some of the larger rivers of Europe, as the Rhône, the Danube, the Weser, and the Nuthe, near its confluence with the Elbe. It was formerly an inhabitant of our own island, and Giraldus Cambrensis gives us a short account of their manners in Wales; but in his time (1188) they were only found in the river Teify. By the laws of Hoel-dda, the price of a beaver's skin was fixed at 120 pence, a great sum in those days. Whether the European, Asiatic, and American beavers are specifically identical or not, yet remains to be determined. Certain it is that the European beaver, as proved by the little colony in the Nuthe, displays the same manners and building propensities as its Transatlantic brethren; and per contra, the thirty scattered beavers near the settlements in America are solitary animals, dwelling in burrows like the scattered few along the Rhône, though it must be observed that one from the latter river in captivity exhibited as marked a constructive disposition as any American beaver under the same restrictions. The mode of building as conducted by the beaver of America is described by Hearne with great clearness and the absence of the ordinary exaggeration. The situation chosen is various: where the beavers are numerous, they tenant lakes, rivers, and creeks, especially the two latter, for the sake of the current, of which they avail themselves in the transportation of the materials. They also choose such parts as have a depth of water beyond the freezing-power to congeal at the bottom. In small rivers or creeks in which the water is liable to be drained off when the back-supplies are dried up by the frost, they are led by instinct to make a dam quite across the river, at a convenient distance from their houses, thus artificially procuring a deep body of water in which to build. The dam varies in shape: where the current is gentle, it is carried out straight; but where rapid it is bowed, presenting a convexity to the current. The materials used are drift-wood, green willows, birch, and poplars, if they can be got, and also mud and stones; these are intermixed without order, the only aim being to carry out the work with a regular sweep, and to make the whole of equal strength. Old dams by frequent repairing become a solid bank, capable of resisting a great force of water and ice, and as the willows, poplars, and birches take root and shoot up, they form by degrees a sort of thick hedge-row, often of considerable height. Of the same materials the houses themselves are built, and in size proportionate to the number of their respective inhabitants, which seldom exceeds four old and six or eight young ones The houses, however, are ruder in structure than the dam; the only aim being to have a dry place to lie upon, and perhaps feed in. When the houses are large, it often happens that they are divided by partitions into two or three or even more compartments, which have, in general, no communication, except by water; such may be called double or treble houses, rather than houses divided. Each compartment is inhabited by its own possessors, who know their own door, and have no connexion with their neighbours, more than a friendly intercourse, and joining with them in the necessary labour of building. So far are the beavers from driving stakes, as some have said, into the ground when building, that they lay most of the wood crosswise, and nearly horizontal, without any order than that of leaving a cavity in the middle; and when any unnecessary branches project inward, they cut them off with their chisel-like teeth, and throw them in among the rest to prevent the mud from falling in. With this wood is mixed mud and stones, and the whole compacted together. The bank affords them the mud, or the bottom of the creek, and they carry it, as well as the stones, under their throat by the aid of their fore-paws; the wood they drag along with their teeth. They always work in the night, and have been known during the course of a single night to have accumulated as much mud as amounted to some thousands of their little handfuls. Every fall they cover the outside of their houses with fresh mud, and as late in the autumn as possible, even when the frost has set in, as by this means it soon becomes frozen as hard as stone, and prevents their most formidable enemy, the wolverene or glutton, from disturbing them during the winter. In laying on this coat of mud they do not use their broad flat tails, as has been asserted, a mistake which has arisen from their habit of giving a flap with the tail when plunging from the outside of the house into the water, and when they are startled, as well as at other times. The houses when complete have a dome-like figure, with walls several feet thick, and emerging from four to six feet above the water. The only entrance is deep under water, below a projection called the "angle" by the hunters, and beyond the reach of the frost: near this, also under water, is laid up their winter store, a mass of branches of willows and other trees, on the bark of which they feed. These they stack up, sinking each layer by means of mud and stones, and often accumulate more than a cartload of materials. Besides these winter-houses, in which they are shut up during the severities of the season, they have always a number of holes in the banks which serve them as places of retreat when any injury is offered to their houses, and in these they are generally taken. The entrance to these holes is deep below the water, which fills a great part of the vault itself. When the hunter forces the houses of the beaver in winter (the hunting season), the animals swim beneath the ice to these retreats, the entrances of which are discovered by striking the ice along the banks with an iron ice-chisel, the sound indicating to practised ears the exact spot: they cut a hole in the house and surprise their booty. During the summer the beavers roam about at pleasure, and it is during this season that they fell the wood necessary for repairing their houses and dams, or for building others, commencing the latter about the end of August. Such is the strength and sharpness of their teeth that they will lop off a branch as thick as a walking-stick at a single effort, and as cleanly as if cut with a pruning knife. Large stems they gnaw all round, taking care that their fall shall be towards or into the water. They rapidly fell a tree, the shaft of which is as thick or thicker than a man's thigh, or from six to ten inches in diameter; and places of more than three acres in front of the river and one in depth have been seen with the timber all felled by these animals, though many of the trees were as thick as a man's body. The beaver does not attain its full growth before three years, but it breeds before that time. It produces from two to six at a birth. The flesh of this animal is esteemed by the Canadian hunters, and by the natives, as a great delicacy, and we need not say how valuable its fur is as an article of commerce. It is from certain gandular sacs in the beaver that the substance called castor, or castoreum, used in medicine, is obtained, and which (procured from the European variety) was well known to the ancients.

In captivity the beaver soon becomes familiar and sociable, and, if permitted, will even in a room exercise itself in attempts to build, using brushes, baskets, boots, sticks, and in short anything it can get hold of for the purpose.

The fine fur of the beaver varies from glossy brown to black; the tail, or caudle paddle, used as a rudder in diving or in ascending, is flat, scaled, and oarlike. The length of the head and body of a full-grown animal is about forty inches; of the caudle paddle, one foot. The feet are all five-toed; those of the hind-feet are united by a broad palmated expansion; the nails are strong, and that of the second toe of the hind-feet consists of two portions. On land the gait of the beaver is awkward and shuffling, owing in part to the outward tournure of the hind-feet, which fits them for aquatic progression, and in part to the thick and clumsy configuration of the body. The genus Castor is somewhat isolated, and may be regarded as the type of a subfamily.

271.—The Musquash

(*Ondatra Zibethica*). Fiber Zibethicus, Sabine; Musk-rat, Godman; Ondathra of the Hurons; Musquash, Watsuss, or Wachusk, and also Peesquaw-Tupeyew ('the animal that sits on the ice in a round form') of the Cree Indians. The dentition of this animal (Fig. 271*) presents a close affinity to that of the water-rat and other species of Arvicola, as in Fig. 267. Molars, $\frac{3-3}{3-3}$.

The musquash is a native of North America, and in its general form it resembles the common water-rat, size excepted. In the length of the head and body it measures about fourteen inches, that of the tail being eight or nine. The fur, which is much like that of the beaver, is dark umber brown passing into brownish yellow on the under parts: pied and even white varieties are sometimes seen. The hind feet are not webbed; the tail is compressed laterally, broadest in the middle and covered with a thin sleek coat of short hairs; longer hairs run along the acute margins.

The range of this animal is from lat. 30° as high north as 69°. Small grassy lakes, or swamps, or the grassy borders of slow streams, are its favourite haunts. Vegetable matters are its principal food, as roots, tender shoots, the leaves of various carices, &c.; to which it adds fresh-water muscles (Unio). The musquash swims and dives well, plunging into the water on the least alarm, and diving instantaneously on perceiving the flash of a gun. This animal builds winter habitations, but far less solid and durable than those of the beaver. These habitations are thus described by Dr. Richardson:—"In the autumn, before the shallow lakes and swamps freeze over, the musquash builds its house of mud, giving it a conical form, and a sufficient base to raise the chamber above the water. The chosen spot is generally amongst long grass, which is incorporated with the walls of the house from the mud being deposited amongst it, but the animal does not appear to make any kind of composition or mortar by tempering the mud and grass together. There is, however, a dry bed of grass deposited in the chamber. The entrance is under water. When ice forms over the surface of the swamp, the musquash makes breathing-holes through it, and protects them from the frost by a covering of mud. In severe winters, however, these holes freeze up in spite of their coverings, and many of the animals die. It is to be remarked that the small grassy lakes selected by the musquash for its residence are never so firmly frozen nor covered with such thick ice as deeper and clearer water. The Indians kill these animals by spearing them through the walls of their houses, making their approach with great caution, for the musquashes take to the water when alarmed by a sound on the ice. An experienced hunter is so well acquainted with the direction of the chamber and the position in which its inmates lie, that he can transfix four or five at a time. As soon as them the motion of the spear, it is evident that the animal is struck, the house is broken down, and it is taken out. The principal seasons for taking the musquash are the autumn before the snow falls, and the spring, after it has disappeared, but while the ice is still entire. In the winter time the depth of snow prevents the houses and breathing-holes from being seen. One of the first operations of the hunter is to stop all the holes with the exception of one, at which he stations himself to spear the animals that have escaped being struck in their houses and come hither to breathe. In the summer the musquash burrows in the banks of the lakes, making branched canals many yards in extent, and forming its nest in a chamber at the extremity, in which the young are brought forth When its house is attacked in the autumn, it retreats to these passages, but in the spring they are frozen up. The musquash may be frequently seen on the shores of small muddy islands, sitting in a rounded form, and not easily to be distinguished from a piece of earth, until, on the approach of danger, it suddenly plunges into the water. In the act of diving, when surprised, it gives a smart blow to the water with its tail Its flesh is eaten by the natives, though it has a strong musky flavour The fur is used for hat-making, and between four and five hundred thousand skins are annually imported into Great Britain. The musquash breeds three times in the year, producing from three to seven at a birth.

272, 273.—The Mole-Rat

(*Aspalomys typhlus*, Laxmann) Spalax typhlus, Guldenst.; Aspalax typhlus, Desm., Zemni, Rzaczinski; Slepez, Gmelin, Podolian Marmot, Pennant

This strange animal (which forms the type of a distinct family) is expressly organized as a miner. The body is mole-shaped and covered with close fur, the limbs are short and thick, with strong short claws. The head is broad and flat, with a lateral margin or ridge running from the great naked nose to the ears, and indicated by a line of white stiff hairs. Breadth of head across, 2⅜ inches, length the same. Total length eleven inches Tail wanting. Teeth white general colour pale sandy ash-grey; the hairs pale lead colour at the base The specimen from which these notes were made (in the Paris Museum) was brought from Russia ("le pays des Cosaques du Donn") a second specimen, from Syria was smaller, eight and a half inches long, with bright orange teeth, and the lateral ridge of the head not fringed with white hairs, its colour also was darker.

The mole-rat is a native of Asia Minor, Syria, Mesopotamia, and Southern Russia between the Tanais and Volga The Russians term it Slepez, or the blind, and the Cossacks Stochoi Nomon, which has the same meaning. It is generally supposed to be the ἀσπάλαξ (Aspalax) of Aristotle, but as a species of mole inhabiting Europe (Talpa cæca) has the eyes also rudimentary, this point is doubtful In the mole-rat the eye is a minute black grain lying beneath the skin, which passes over it, and is besides covered with the fur it is evident that the sense of vision is denied to this creature, but by way of amends its internal organs of hearing are largely developed, and the external orifice is wide, though the conch of the ear is almost obsolete The mouth is small, the tip of the nose is largely bare and cartilaginous, with the nostrils wide apart and placed below. The mole-rat has much of the manners of our common mole it is gregarious, and its burrows are clustered together Rich level plains are its favourite localities Its burrows consist of galleries at a little distance below the surface of the earth, which communicate with chambers sunk to a greater depth. From its galleries it drives lateral passages in search of roots, particularly of the bulbous Chærophyllum, on which it feeds. According to Rzaczinski, it also devours grain, of which it amasses a store in its burrow for winter consumption Its actions are sudden and quick, but irregular, and it moves along with equal ease both forwards and backwards. It burrows very expeditiously In the morning it often quits its retreat and basks with its mate in the sun. At the least noise it raises its head to listen, and in a menacing attitude, when attacked, it snorts and gnashes its teeth, and defends itself resolutely, inflicting severe wounds. There is a superstition among the people of the Ukraine, that the hand which has suffocated one of these animals is gifted with the virtue of curing scrofulous affections.

274, 275.—The Canada Sand-Rat

(*Geomys bursarius*). Mus bursarius, Shaw. Fischer regards, and perhaps correctly, the genera Saccophorus, Pseudostoma, Diplostoma, and Saccomys, as synonymous with the genus Geomys of Rafinesque, and which is represented by the sand-rat, distinguished by large cheek-pouches, which when full have an oblong form and nearly touch the ground, but when empty are retracted for three-fourths of their length. Their interior is very glandular, particularly the orifice that opens into the mouth. The incisors are $\frac{4-4}{4-4}$. Fig 275* represents the skull and teeth of Geomys, as given by Dr. Richardson: 1, 2, 3, skull, natural size, in different views: 4, lower jaw; 5, palate and upper teeth; 6, upper grinder magnified. Fig 276 represents the teeth of Geomys (Saccomys, F Cuv) enlarged.

The skull is large and depressed, the nose short, the nasal and frontal bones are in the same plane, the palate is very narrow, and the zygomatic arch is but little depressed below the upper surface of the skull

The nostrils are somewhat lateral, the mouth is contracted, the pendulous cheek pouches are thinly clothed with short hairs, and sometimes almost naked —they open into the mouth by the side of the molar teeth, auditory openings large, external ear almost obsolete, eyes small and far apart, body cylindrical, tail of moderate length, round, tapering, and more or less hairy. Limbs short, toes five on each foot, with strong claws

Dr Richardson observes that the sand rats burrow in sandy soils, and feed on acorns, nuts, roots, and grass, which they convey to their burrows in their cheek-pouches, they throw up little mounds of earth, like mole hills, in summer, but are not seen abroad in the winter season, speaking of the Columbia sand-rat, he observes, that when in the act of emptying its pouches it sits up like a marmot or squirrel, and squeezes the sacks against its breast with its fore paws and chin These animals commit great havoc on the potato-fields The Canada sand rat is known only from Dr Shaw's description (in the 'Linnæan Transactions' vol v, p 227) of a specimen in Mr Bullock's Museum, and which afterwards passed into the hands of M Temminck There is no specimen in any of our museums, nor did Dr. Richardson see the animal in his expedition It may, however, possibly prove to be identical with one of the species he has described This animal is stated to be about the size of a common rat, and of a pale-greyish brown. A specimen of the mole like sand rat (G talpoides) is preserved in the collection of the Zool Soc. It is a native of the borders of the Saskatchewan.

277.—The Camas Pouched Rat

(*Diplostoma bulbivorum*) The animals of this genus differ from those of the genus Geomys, in having cheek pouches which open externally at the sides of the mouth, and are carried inwards and downwards along the side of the lower jaw, these pouches are not pendulous, the mouth is a vertical fissure nearly an inch long, entirely exposing the incisors, and the lateral fold of skin before the opening of the pouch is covered internally and externally with fur The body resembles that of a great mole with a large clumsy head

The animals of this genus were termed "Gauffres," by the early French travellers there appear to be several species

The Camas pouched-rat is common in N America, on the banks of the Columbia river, and the Multnomah, where it is known under the name of Camas-rat, because the bulbous root of the Quamash or Camas-plant (Scilla esculenta) forms its favourite food. It is eleven inches long, and of a chesnut brown colour These animals, the Gauffres of the French, are excessively voracious, and they are very destructive to beets, carrots, and similar vegetables They live almost exclusively under ground, working their way like a mole, and are said to fill their cheek-pouches with the earth by means of their paws, and to empty them of their contents at the mouth of the burrow.

278.—The Coast-Rat

(*Bathyergus maritimus*) The dental form of Bathyergus (Oryeterus, F Cuv) is as follows Molars $\frac{4-4}{4-4}$ (see Fig 278*). In this genus are comprehended several species of mole like Rodents peculiar to Africa the whole form and organization of which fit them for an underground existence The most remarkable is the coast-rat, or sand-mole of the downs This species is a native of Southern Africa, frequenting sandy tracts along the coast. On the surface of the ground it proceeds slowly, but it burrows with great rapidity, and works out long galleries, throwing up hillocks as does the mole. In some districts these are extremely numerous, rendering it dangerous to pass over them on horseback, and not pleasant even on foot, the earth, where excavated, suddenly giving way This animal is about a foot in length, exclusive of the tail, which is about three inches. The incisors are of enormous size, and those above have a deep longitudinal furrow down the front; and a hairy palate extends behind them. The general colour is greyish ash.

279.—The Rabbit Cercomys.

This animal, which in shape resembles a rat, represents the genus Cercomys, closely allied to that of Echymys, containing the spiny rats. The molars are $\frac{4-4}{4-4}$ rooted. The general colour of this species is deep brown above, paler on the sides and cheeks; all the under parts are whitish; the tale is long, like that of the rat; ears and eyes large. It is a native of Brazil, but of its habits we have no detailed accounts. The teeth of the genus Echymys (a South American group) are figured 280

281.—Cuming's Octodon

(*Octodon Cumingii*) Dendrobius Degus, Meyen. The family Octodontidæ is established for a few allied genera peculiar to South America, of which that termed Octodon is the type. Molars, $\frac{4-4}{4-4}$. The antorbital foramen is as large as the orbit, or nearly so The descending ramus of the lower jaw is deeply emarginated behind, and the posterior angle acute Fig 282 represents the skull of Octodon in different views, and Fig. 283 the skull of an allied genus, Ctenomys.

Cuming's Octodon in size and shape resembles a water-rat General colour brownish grey; clouded with dusky black, under surface dusky grey; base of the tail beneath nearly white.

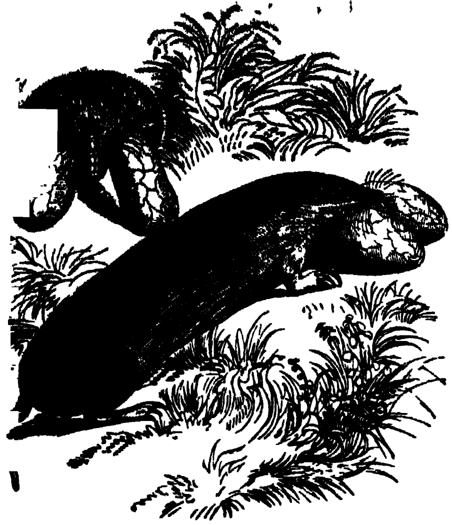
These animals are exceedingly abundant in the central parts of Chile They frequent by hundreds the hedge-rows and thickets, where they make burrows which communicate with one another. In the neighbourhood of Valparaiso multitudes may be seen together feeding fearlessly in the day-time. Sometimes they ascend the lower branches of small shrubs, but not often They are very destructive to fields of young corn On being disturbed, they all run like rabbits to their burrows When running they carry their tails raised up, more like squirrels than rats, and they also sit up like those animals. According to Molina they lay up a winter store of food, but do not become dormant The Octodon is the Degu of that writer he says that the Indians used formerly to eat them with much relish Piebald and albino varieties are not uncommon. The greatest enemy of these active little creatures is a species of horned owl, which feeds chiefly upon them.

284.—The Tucutuco

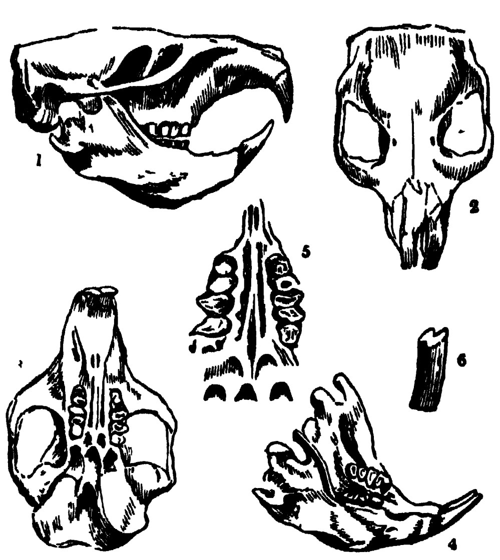
(*Ctenomys Magellanicus*) General colour brownish grey tinged with yellow and slightly varied by a blackish tint, under parts paler, chin and throat pale fawn Length of head and body about seven inches, of the tail about two inches and a quarter. Toes, as in Octodon, five on each foot

Locality The east entrance of the Strait of Magelhaens at Cape Gregory and the vicinity (King) The wide plains north of the Rio Colorado are undermined by these animals; and near the Strait of Magelhaens, where Patagonia blends with Tierra del Fuego, the whole sandy country forms a great warren for them

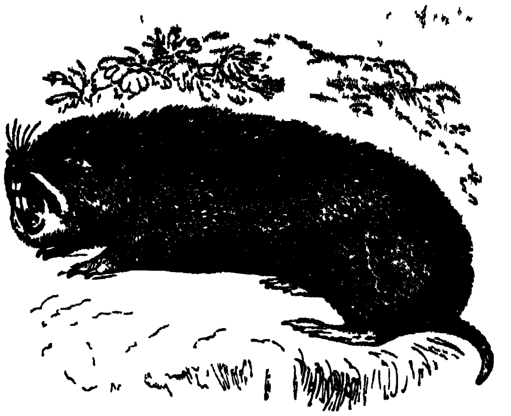
Mr Darwin ('Journal and Remarks') gives a circumstantial account of this curious animal, which he well describes as a rodent with the habits of a mole "The tucutuco," says that author, "is extremely abundant in some parts of the country, but is difficult to be procured, and still more difficult to be seen when at liberty It lives almost entirely underground, and prefers a sandy soil with a gentle inclination The burrows are said not to be deep, but of great length They are seldom open, the earth being thrown up at the mouth into hillocks, not quite so large as those made by the mole. Considerable tracts of country are so completely undermined by these animals, that horses, in passing over, sink above their fetlocks. The tucutucos appear, to a certain degree, to be gregarious The man who procured specimens for me had caught six together and he said this was a common occurrence They are nocturnal in their habits, and their principal food is afforded by the roots of plants, which is the object of their extensive and superficial burrows. Azara says they are so difficult to be obtained, that he never saw more than one He states that they lay up magazines of food within their burrows. This animal is universally known by a very peculiar noise which it makes when beneath the ground A person, the first time he hears it, is much surprised for it is not easy to tell whence it comes, nor is it possible to guess what kind of creature utters it The noise consists in a short but not rough nasal grunt, which is repeated about four times in quick succession; the first grunt is not so loud, but a little longer and more distinct than the three following the musical time of the whole is constant, as often as it is uttered. The name Tucutuco is given in imitation of the sound. In all times of the day, where this animal is abundant, the noise may be heard, and sometimes directly beneath one's feet. When kept in a room, the tucutucos move both slowly and clumsily, which appears owing to the outward action of their hind-legs; and they are likewise quite incapable of jumping even the smallest vertical



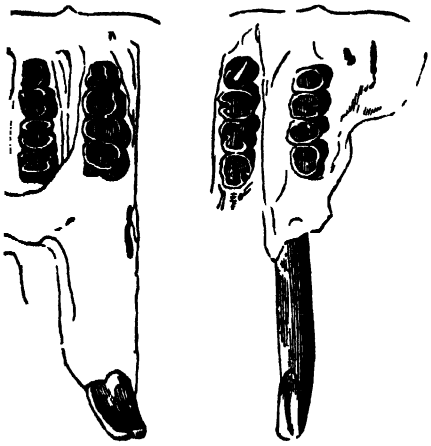
275.—Canada Sand Rat



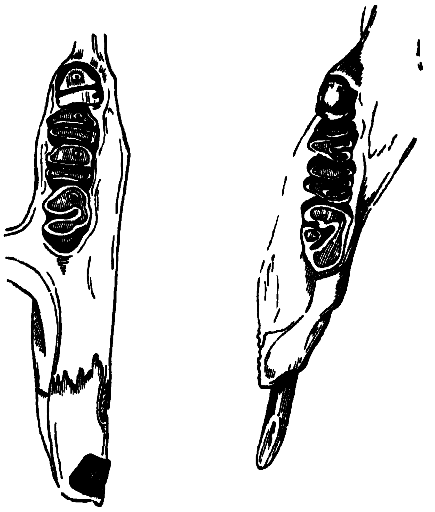
275*.—Skull and Teeth of Canada Sand Rat



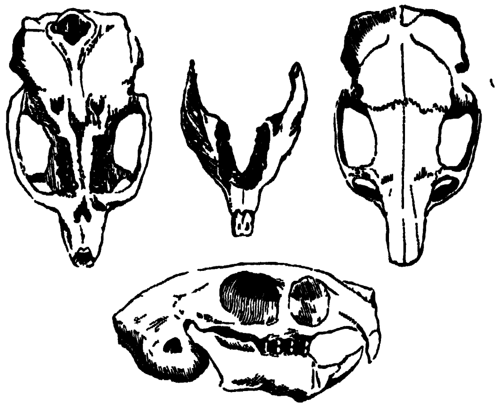
277.—Camas Pouched Rat.



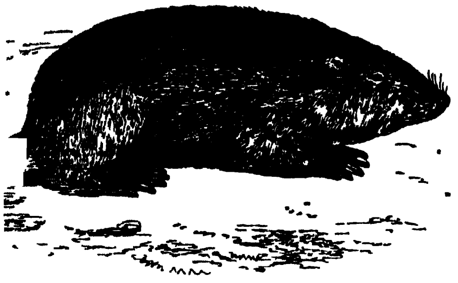
276.—Teeth of Canada Sand Rat.



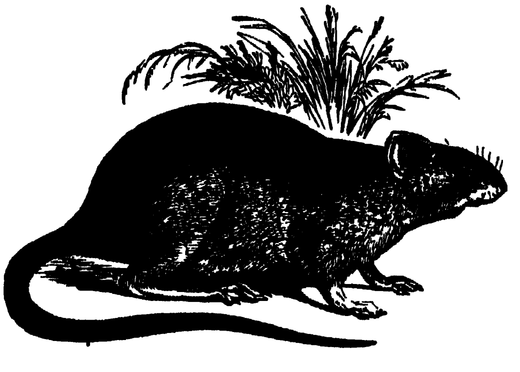
278*.—Teeth of Coast Rat



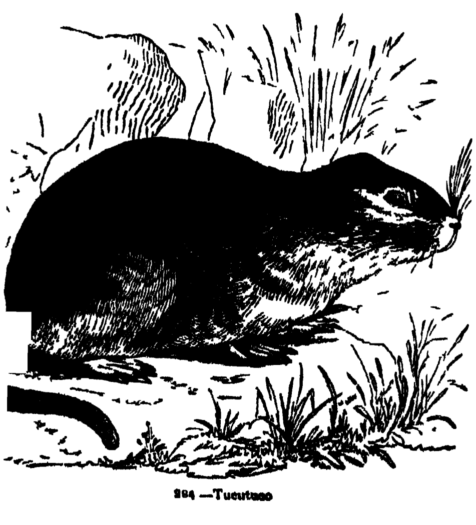
282.—Skull of Cuming's Octodon.



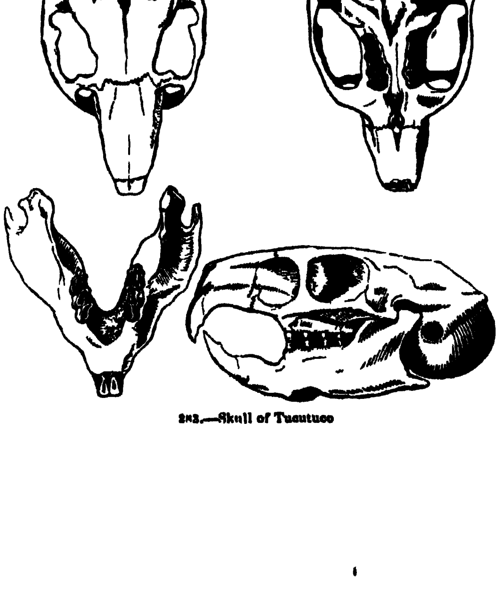
278.—Coast Rat.



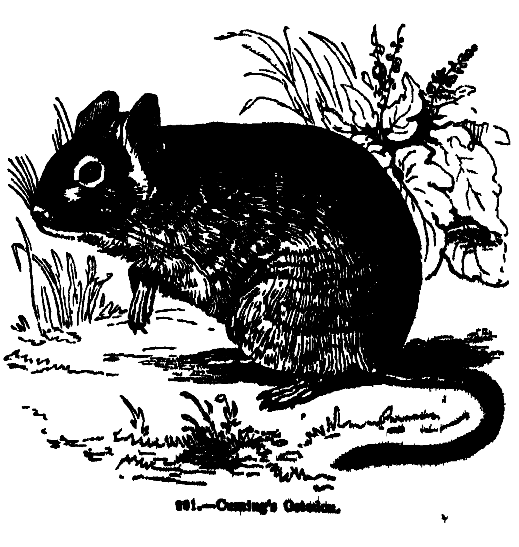
279.—Rabbit Cercomys



284.—Tucutuco

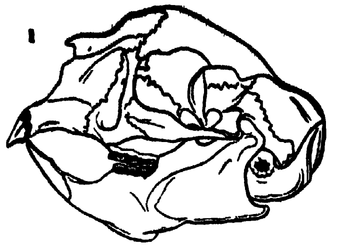


283.—Skull of Tucutuco



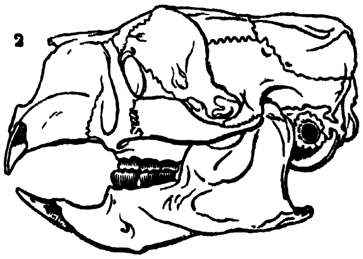
281.—Cuming's Octodon.

293.—Common Porcupine.

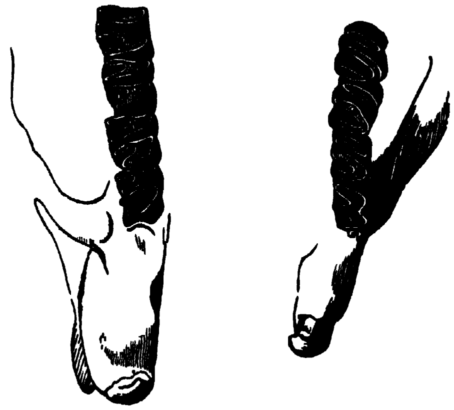


Skull of Acanthion Javanicum

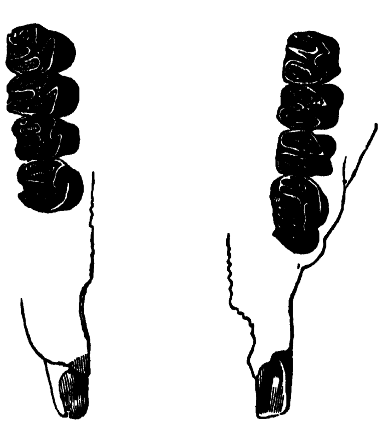
292.—Common Porcupine.



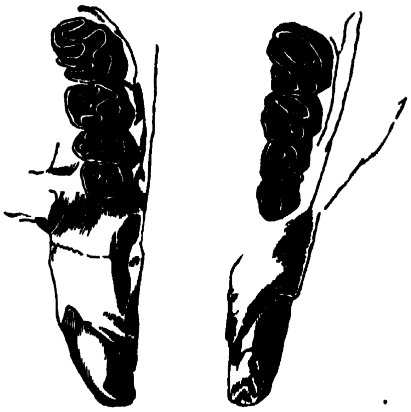
291.—Skull of Common Porcupine.



280.—Teeth of Ecnymys.

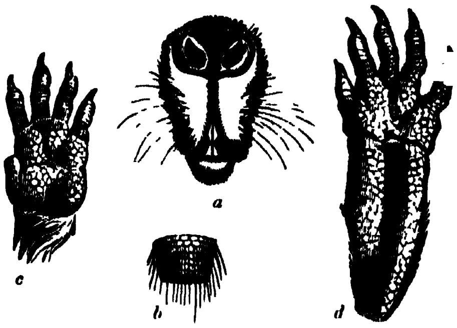


290.—Teeth of Erethizon.

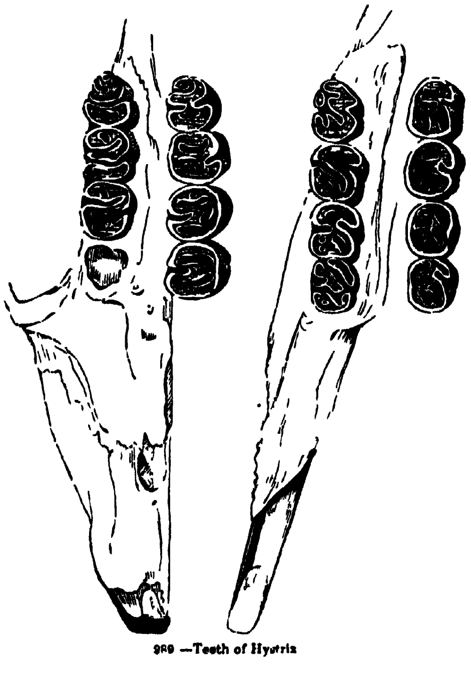


288.—Teeth of Coypu

285.—Utia.



286.—Muzzle and Paws of Utia



289.—Teeth of Hystrix

294.—Brazilian Porcupine.

287.—Coypu.

height. When eating they rest on their hind-legs and hold the piece in their fore-paws; they appear also to wish to drag it into some corner. They are very stupid in making any attempt to escape; when angry or frightened, they utter the tucutuco. Of those I kept alive, several, even the first day, became quite tame, not attempting to bite or to run away; others were a little wilder. The man who caught them asserted that many are found blind. A specimen which I preserved in spirits was in this state. When the animal was alive I placed my finger within half an inch of its head, and not the slightest notice was taken: it made its way however about the room nearly as well as the others."

285.—The Utia

(*Capromys Furnieri*). Isodon Pilorides, Say. Mr. Waterhouse considers the genus Capromys as one of those included in the Histricine section of Rodents. The anterior paws have four toes and a rudimentary thumb; the hind-feet are thick, broad, and strong, and five-toed; the claws are strong; the soles of all the feet are naked, and covered with a coarse granular black skin, divided into pads by deep fissures. The muzzle is obtuse; the nostrils are open, oblique, edged externally with an elevated rim, and separated by a medial furrow, running to the fissure of the upper lip. The whiskers are long; the tail is annulated with a scaly epidermis, with short thinly-set hairs from between each scale (see Fig. 286: *a*, muzzle; *b*, portion of tail; *c*, under part of fore-foot; *d*, under part of hind-foot). The ears are moderate, erect, almost rounded. Molars $\frac{4-4}{4-4}$, with the crown traversed by folds of enamel. Eyes small.

This animal is a native of Cuba, where it is known by the name of Utia. It appears to have been described by Bomare and Oviedo three hundred years ago. The general colour of the utia is glossy brown grizzled with yellowish grey; the muzzle, chest, and under parts greyish white; the fur of a coarse texture; length about two feet two inches, of which the tail is eight inches.

With respect to the habits of the utias in a wild state, it is only known that they are found in the woods, that they climb trees with great facility, and that they live on vegetables. From observations on those kept in a domesticated state, M. Desmarest gives the following details:—"Their intelligence appears to be developed to as great a degree as that of rats and squirrels, much more so than that of rabbits and guinea-pigs. They have, indeed, a great share of curiosity. At night they are very wakeful, and the form of the pupils is indicative of nocturnal habits. The sense of hearing does not appear to be so acute as that of rabbits or hares. Their nostrils are incessantly in motion, especially when they smell any new object. Their taste is sufficiently delicate to enable them to distinguish and reject vegetables which have been touched by animal substances, to which they manifest the greatest repugnance. They agree perfectly well together, and sleep close by each other. When they are apart they call each other by a sharp cry, differing little from that of a rat. Their voice, when they express pleasure, is a low soft kind of grunting. They scarcely ever quarrel except for food—as when one piece of fruit is given between both; in that case one seizes and runs away with it, until the other is able to take it from him. They sometimes play for a long time together, holding themselves upright in the manner of kangaroos, firmly supported upon the broad soles of their hind-feet and the base of the tail, and striking each other with their paws, until one of them, finding a wall or some other body against which to support himself, acquires an additional power, and gains an advantage; but they never bite each other. Towards other animals they manifest the greatest indifference, paying no attention even to cats. They are fond of being caressed, and particularly of being scratched under the chin. They do not bite, but slightly press with the incisor teeth the skin of those who caress them. They do not ordinarily drink, but occasionally suck up water as squirrels do. Their food consist of vegetables exclusively, such as cabbage, succory, grapes, nuts, bread, apples, &c. They are not very difficult in the choice of their food, but still have a particular fondness for strong-flavoured herbs and aromatic plants, as wormwood, rosemary, geraniums, pimpernel, celery, &c. Grapes pleased them much, to obtain which they would instantly climb up a long pole, at the top of which the fruit was placed. They are also fond of bread steeped in aniseed or even wine. These animals are plantigrade: their movements are slow, and their hinder parts are embarrassed when they walk, as is observable in the bear. They leap occasionally, turning suddenly round from head to tail like the field-mouse. When they climb, which they do with the greatest ease, they assist themselves with the base of their tail as a support, and the same in descending. In certain positions, on a stick for example, the tail serves as a balance to preserve their equilibrium. They often raise themselves to a listening attitude, sitting erect, with the paws hanging down, like rabbits and hares. In eating they employ sometimes only one, sometimes both their fore-paws; the former is the case when the substance they are holding is small enough to be held between the fingers and the tubercle at the base of the thumb."

287.—The Coypu

(*Myopotamus Coypus*). Quoiya, d'Azara; Couï, Molina; Hydromys Coypus, Geoff.; Mus Castorides, Burrow.

The coypu is common in certain districts of South America, as Chile, Buenos Ayres, and Tucuman. The head is large; the muzzle obtuse: the ears small and round; fore-feet with a rudimentary thumb and four toes, all free: hind-feet plantigrade, with five toes, of which the outermost only is free, the rest palmated. Tail strong and scaly, and sprinkled with scattered hairs. Molars $\frac{4-4}{4-4}$, increasing in size from the first to the last, with winding folds of enamel (see Fig. 288). The eyes are small, approximating to each other, and placed high in the head. Behind the upper incisors there is a hairy palate or space, a peculiarity noticed also in Bathiergus. The body is clothed with two sorts of hair, an under-garment of fine close fur almost water-proof, and an upper layer of long, shining, straight hairs of a rich brown, which is the general colour, the muzzle being dirty white. The limbs are short but strong; and the movements of the animal on land are slow and crawling.

The coypu remained unknown to the scientific world, while thousands of its skins, under the name of Racoonda, for more than forty years had been annually imported into Europe, for the sake of the fine under-fur, which, like that of the musquash and beaver, is extensively used in the manufacture of hats.

This animal is gregarious and aquatic, residing in burrows which it excavates along the banks of rivers: and in these burrows the female produces and rears her young, from three or four to seven in number, to which she manifests great attachment. In the Chonos Archipelago, according to Mr. Darwin, "these animals, instead of inhabiting fresh water, live exclusively in the bays or channels which extend between the innumerable small islets of that group." "The inhabitants of Chiloe, who sometimes visit this archipelago for the purpose of fishing, state that these animals do not live solely on vegetable matter, as is the case with those inhabiting rivers, but that they sometimes eat shell-fish. The coypu is said to be a bold animal, and to fight fiercely with the dogs employed in chasing it. Its flesh when cooked is white and good to eat. An old female procured on these islands weighed between ten and eleven pounds" An extensive trade in the skins of these animals is carried on at Buenos Ayres, where they are improperly called "Nutrias," or otters. In captivity the coypu soon becomes gentle and attached; and is evidently pleased with marks of attention from those with whom it is familiar. Length of adult male, one foot eleven inches, exclusive of the tail, which is one foot three inches.

The Family Histricidæ, or Porcupines.—The porcupines, a spine-clad family, are divided into the genera Hystrix, Erethizon, Synetheres, &c., and are respectively distributed over Europe and North Asia, Africa, India and its islands, and North and South America. All the porcupines have the molars four in each jaw on each side; nearly equal in size, and furnished with distinct roots; when worn the surfaces present tortuous folds of enamel (see Fig. 289, the teeth of Hystrix, and Fig. 290, the teeth of Erethizon). The tongue is rough with papillæ, like those of the cats; the head is short and blunt; the nostrils large and open; the ears and eyes comparatively small; and the general form thick and clumsy.

Two figures of skulls (Fig. 291) represent the skull of a species termed, by F. Cuvier, Acanthion Javanicum (1), and that of the common porcupine (2), by way of comparison. With respect to the genus Acanthion founded by F. Cuvier on the characters of two skulls, one of which was brought from Java, we are strongly inclined to consider it identical with the genus Atherura of Baron Cuvier, though the latter, in his 'Règne Animal,' makes no allusion to the genus proposed by his brother. Fischer gives the Acanthion Javanicum of F. Cuvier as identical with the fasciculated porcupine (Atherura fasciculata), and is probably correct. The fasciculated porcupine has been long known to science, and is figured by Buffon as the "Porc-épic de Malacca;" but since his time, till within the few last years, no specimen had reached Europe. In 1828, M. Diard sent a skin and skeleton to France, from India, and about the same time a living individual was brought to England by Lieut. Vidal, and presented to the Zool. Soc. Lond. It was described and figured by Mr. Bennett, and now forms a part of the riches of the museum. This individual, however, was not brought from India or its islands, but from Fernando Po, where it is stated to be in such abundance as to furnish a staple article of food to the inhabitants. Whether it be truly indigenous there, or was originally brought by the early Portuguese settlers to that island from India or Java, and has become naturalized, are points unsettled.

292, 293.—The Common Porcupine

(*Histrix cristata*)—Porc-épic of the French: Istrice of the Italians; Stachelschwein, Dornschwein, and Porcopick of the Germans. This spine-covered animal is found in Italy, throughout Africa, in Southern Tartary, the borders of the Caspian Sea, Persia, and India; it was observed by Mr. Hodgson inhabiting the central and lower regions of Nepâl. When full-grown it is upwards of two feet in length; but the specimens from Italy are generally smaller than the African, and have shorter quills. It would appear that in Italy it is not indigenous, but has become naturalized.

The porcupine is a nocturnal animal, of quiet and secluded habits, passing the day in its subterranean retreat, for the digging of which its muscular limbs and stout claws are well adapted. At night it steals forth to feed; roots, bark, fruits, and vegetables constitute its diet. In winter it appears to undergo a partial hybernation. Sluggish and timid, the porcupine is yet enabled, clothed in its array of spears, to repel the assault of enemies: when driven to act on the defensive, he bends his head down, turns his back towards his assailant, erects his spines, and receiving the rash assault, pushes them forcibly by the action of the whole body against the aggressor. The wounds thus inflicted are very severe, and do not heal readily. The spines of the porcupine are of two sorts: one short being long, slender, and bending; the other spines, concealed beneath the former, are short, thick in the middle, and tapering to a sharp point; they are ringed black and white. The length of the short spines, which are the true effective weapons, is from four to ten inches, and the point, which consists of flint-like enamel, is somewhat compressed with two slightly raised and opposite ridges, which when minutely examined are found to be finely jagged. There is another sort of furniture on the tail, namely, a number of dry, hollow, open quills, of considerable circumference, and supported upon long and very slender stalks, which vibrate with every motion. When the porcupine clashes these together they produce a rustling noise. The apparatus by which the spines and these hollow rattles are clashed and raised consists of a strong muscular expansion underneath, and adherent to the thick skin. From the raising and clashing of the spines, and perhaps the accidental falling of one looser than the rest (about to be shed naturally), has arisen the belief that the animal was capable of darting his spines, like a javelin, point foremost—an error we need not stay to confute.

294.—The Brazilian Porcupine

(*Synetheres prehensilis*). Cuandu of Marcgrave; Coendu, Buffon; Prehensile Porcupine of Pennant.

In North America the porcupines are represented by the Hairy or Canada Porcupine (Erethizon dorsatum), which is in a great degree arboreal in its habits. In Brazil we are presented with the species termed Cuandu, more decidedly organised as a climber, having a prehensile tail, resembling that of the oppossum. The muzzle is broad and short; the head convex in front, the spines rather short; the tail very long, and naked for half its length. The feet have only four toes. The length of this species is about two feet, exclusive of the tail, which is about eighteen inches; the nose is covered with brownish hair; the ears are nearly naked; the body is covered above with spines, the longest (on the lower part of the back) are about three inches in length; those on the sides and base of the limbs are the shortest. All are sharp, and barred near their points and roots with white; brown in the middle. The basal half of the tail is clad with short spines; the breast, under parts, and lower portion of the limbs with dark brown bristles.

The Brazilian porcupine appears very much to resemble the Canada porcupine in its habits, living in woods, sleeping by day, and feeding on fruits, &c. by night. Marcgrave states that its voice is like that of a sow. The quills are stated to have the same penetrating and destructive quality as those of the Canadian species. It is a sluggish animal, climbing trees very slowly, and holding on with its prehensile tail, especially in its descent. It grows very fat, and the flesh is said to be white and well-tasted. Our cut is taken from a living specimen in the garden of the Zoological Society.

Family Chinchillidæ.—To the animals of this family, of which the beautiful chinchilla is the type, the attention of English naturalists was first called by Mr. Bennett, whose admirable paper on the subject will be found in the first volume of the 'Trans. Zool. Soc.' In this paper three genera are clearly and fully characterized, viz.: Lagotis, Benn.; Chinchilla, Benn.; and Lagostomus, Brookes. The Chinchillidæ are all peculiar to South America, and are burrowing and gregarious in their habits. Their food is exclusively vegetable. The molar teeth are $\frac{4-4}{4-4}$, destitute of true roots.

295, 296, 297.—THE CHINCHILLA

(*Chinchilla lanigera*) The characters of the genus Chinchilla, as established by Mr. Bennett, are as follows:—Molars, $\frac{4-4}{4\ \ 4}$, crossed obliquely on their surface by three lines of enamel. Toes, on the fore-feet, five; on the hind-feet, four. Tail of moderate length, and hairy; ears broad, rounded, and nearly naked; eyes large and full; fur long, thick, close, soft and woolly.

The chinchilla appears to have attracted in very early times the notice of travellers, though the accounts scattered in their works have been but little regarded by naturalists In 1824 Schmidtmeyer, in his travels over the Andes into Chile, notices the chinchilla as a "woolly field-mouse which lives underground, and chiefly feeds on wild onions. Its fine fur is well known in Europe, that which comes from Upper Peru is rougher and larger than the chinchilla of Chile, but not always so beautiful in its colour Great numbers of these animals are caught in the neighbourhood of Coquimbo, and Copiapo, generally by boys with dogs, and sold to traders, who bring them to Santiago and Valparaiso, from whence they are exported. The Peruvian skins are either brought to Buenos Ayres from the eastern parts of the Andes, or sent to Lima. The extensive use of this fur has lately occasioned a very considerable destruction of the animals." From this passage it would appear that there are two or more species of chinchilla, respectively Chilian and Peruvian, and hence we suspect is to be accounted for the difference in the colour and quality of the chinchilla fur, which we have frequently observed. Our examination of specimens in the Paris museum also leads us to the same conclusion

A native of the valleys in the high mountain districts of South America, where the cold is often very severe, the deep woolly coat of the chinchilla is well calculated for preserving warmth Whether in the winter season the animal hybernates or not yet remains to be discovered Of its manners, indeed, we know little In captivity it is quiet, inoffensive, and cleanly it feeds sitting up on its haunches like a squirrel, holding its food between its fore-paws. Its ratio of intelligence is on the same par with that of the rabbit or guinea pig hence it displays no indications of attachment to those who feed it, nor much animation or playfulness. In its alpine valleys it associates in numbers, excavating burrows, in which it resides. The female breeds twice a year, producing from four to six young at a birth Various roots, especially those of bulbous plants, constitute the diet of the chinchilla. The colour of the fur of this species is clear grey above, but varying in depth, and passing into white on the under parts its quality is exquisitely fine, and its length renders it well adapted for spinning. Indeed, Molina informs us that "the ancient Peruvians, who were far more industrious than the modern, made of this wool coverlets for beds, and valuable stuffs" The tail is covered with long bushy hairs, and usually kept turned up towards the back. In length the chinchilla measures about nine inches, exclusive of the tail, which is five inches The fore-limbs are comparatively short the head has much resemblance to that of a young, full-haired rabbit, the muzzle is short and blunt, and furnished with long whiskers; the eyes are black, the ears are ample. The skull is remarkable for the size of the antorbital foramen and the amplitude of the tympanic bulla. The general skeleton is slightly built, and the bones are slender, the ribs are thirteen on each side. Fig 298 represents the skull and skeleton of the Chinchilla Lanigera. *a*, skull seen from above; *b*, the same seen from below, *c*, the lower jaw.

299.—CUVIER'S LAGOTIS

(*Lagotis Cuvieri*). Of the genus Lagotis two species were described and figured by Mr. Bennett (see the 'Trans Zool. Soc.,' vol. i.). In this genus the toes of the anterior as well as posterior feet are four. The hind limbs are considerably developed; the muzzle is somewhat elongated and narrow, and furnished with long whiskers; the eyes are moderate, but prominent; the ears are elongated, rounded at the tip, and rolled inwards at the edges. The fur is soft, long, and downy, and but loosely attached to the skin. The tail of tolerable length, and bushy, with long, stiff, wiry hairs. General contour rabbit-like.

M. Desmarest was the first to suggest that a viscacha observed by Feuillée in Peru, and, as he says, often domesticated in the houses at Lima, was a distinct species from the viscacha of the Pampas; and a careful examination of the scattered notices published by travellers respecting the viscachas of the eastern and western sides of the Andes led Mr. Bennett to form the same opinion, which was confirmed by the acquisition of a living animal regarded as the Peruvian viscacha of the older writers The references to the Peruvian viscacha by various of the early travellers in South America are by no means limited, and in collating them, Mr Bennett evinced a spirit of laborious research. He refers to Pedro de Cieça, 1551, Acosta 1590, Garcilago de la Vega, 1609, Nieremberg, 1635, Feuillée, 1725, and Antonio de Ulloa, 1772 The last writer, in his 'Noticias Americanas,' gives a correct account of the habits and manners of the animal in question. Mr Bennett's translation is as follows —"Taking the place of the rabbit, which is wanting in Peru, there is another kind of animal, called viscacha, which is not found in Quito In form and in the colour of the fur it is similar to the rabbit, but differs from it in having a long tail furnished with tufted hair, which is very thin towards the root, but thick and long as it approaches the tip It does not carry its tail turned over the head like the squirrel, but stretched out, as it were, in a horizontal direction: its joints are slender and scaly These animals conceal themselves in holes of the rocks in which they make their retreats, not forming burrows in the earth like rabbits There they congregate in considerable numbers, and are mostly seen in a sitting posture, but not eating they feed on the herbs and shrubs that grow among the rocks, and are very active. Their means of escape do not consist in the velocity of their flight, but in the promptitude with which they run to the shelter of their holes. This they commonly do when wounded, for which reason the mode of killing them is by shooting them in the head, as, if they receive the charge in any other part, although much injured, they do not fail to go and die in the interior of their burrows. They have this peculiarity, that as soon as they die their hair falls off, and on this account although it is softer, and somewhat longer and finer than that of the rabbit, the skin cannot be made use of for common purposes. The flesh is white, but not well flavoured, being especially distasteful at certain seasons, when it is altogether repugnant to the palate." Molina speaks of the employment of its wool among the ancient Peruvians, adding, that the Chilians of the present day (his work was originally published in 1782, and reprinted with additions in 1810) use it in the manufacture of hats.

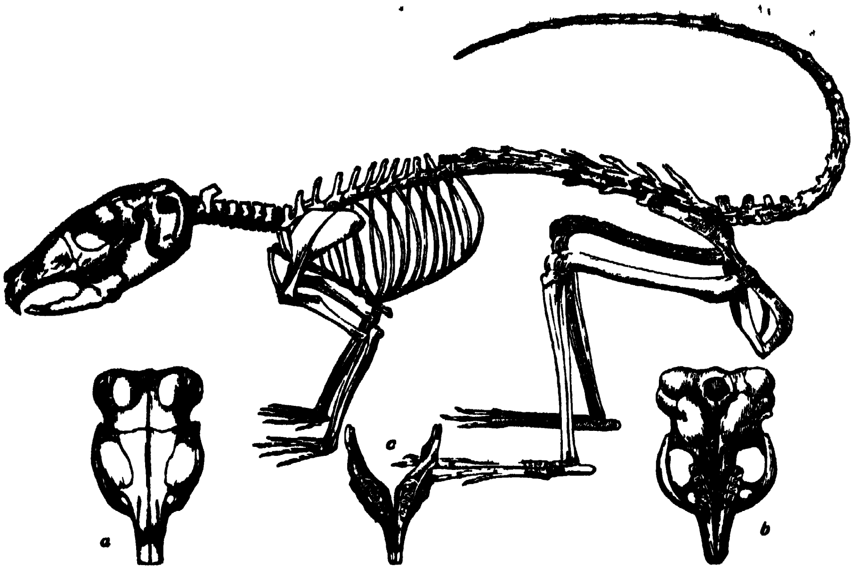
The general colour of the viscacha of the western acclivities of the Peruvian Andes, or Cuvier's lagotis (L Cuvieri), is greyish ash, clouded here and there with a tint of brown. The hairs of the tail are mingled black and white The ears equal the head in length. The body measures sixteen inches, including the head, the tail, about twelve inches. Fig 300 represents the skeleton, with the skull of the Lagotis Cuvieri *a*, skull seen from above, *b*, the same seen from below, *c*, lower jaw, *d*, crown of the two anterior molar teeth of the lower jaw enlarged, *e*, crowns of the two posterior molar teeth of the upper jaw, enlarged

301.—THE VISCACHA OR BISCACHA OF THE PAMPAS

(*Lagostomus trychodactylus*, Brookes). The Marmot Diana of Griffith Generic characters—the molars consisting of two oblique lamellæ, excepting the posterior one in the upper jaw, which consists of three, anterior feet with only four toes, hinder feet with only three, tail moderate. Of this genus (Lagostomus) we know but one species of which the earliest notice to be found is in Dobrizhoffer's 'Historia de Abiponibus,' 1784. He informs us that it is called by these people Nehelaterck, and that it resembles a hare with the tail of a fox "It digs its burrows on the more elevated parts of the plains with so much art, that no aperture is left by which the rain can penetrate, and these burrows are divided into distinct settlements, numerous families inhabiting the same locality. On the surface of the ground are several entrances into the burrow, at which, towards sun-set, the animals may be seen seated in crowds, diligently listening for the sound of any person approaching. If everything remains quiet, they venture forth by moonlight to feed, and commit sad havoc on the neighbouring fields, for they devour both European wheat and Indian corn with great avidity, despising grass when either is to be obtained. Hence the stations of the biscachas are seldom to be met with in the desert plains, but indicate with certainty the proximity of Spanish settlements; and it has often been a matter of surprise to me that I have never seen the biscacha in the territories (though well covered with crops of all kinds) either of the Abipones or the Guaranis. They are in the habit of heaping up at the entrances of their burrow dry bones, chips of wood, and refuse articles of every sort which fall in their way. The purpose, however, for which these things are collected, is beyond conjecture. The Spanish colonists occasionally spend an idle hour in hunting them; they pour buckets of water into the subterranean retreats of the creatures, which to avoid being drowned issue forth into the plain where, without any means of escape, they are killed with sticks Their flesh, unless they are very old, is not considered despicable even by the Spaniards." In 1789 the Abbé Jolis wrote a work, which, however, appears not to have been completed, entitled 'An Essay on the Natural History of Granchaco,' (Saggio sulla Storia Naturale della Provincia del Granchaco), and in this he gives from long observation, a description of the Pampas biscacha, which differs in some particulars from that of Dobrizhoffer. "They resemble," he says, "our hares, but have the body somewhat more arched They live in society, in burrows underground, which they form for themselves, excavating in all directions to the extent of a mile in circumference, with various exits and separate retreats, in which the old live distinct from the young The soil in which these are usually made is that which is hard and barren, and destitute of everything, but with bushes (boscaglie) at no great distance, and pasture of tender grass, roots, and the bark of trees They collect around their retreats bones, dried leaves, and whatever they find in the neighbourhood, if anything is missing in their districts, it is to be found with certainty piled up in these situations the following day. As they are animals that avoid the light, having little power of vision, they are not to be seen in the daytime, unless at dawn, or towards evening after sunset. The night, and especially when the moon shines, is the proper time for seeking their food. Fierce and courageous, they defend themselves with all their might against the dogs, and sometimes even attack the legs of the hunters"

But neither of those authors mentions the somewhat anomalous companions with which the biscachas are associated, and we select, from the travels of Proctor, Head Miers, and Haigh, the account of the first-named traveller, which, as Mr. Bennett observes, gives nearly all the particulars which are to be found in the rest. "The whole country from Buenos Ayres to San Luis de la Punta, is more or less burrowed by an animal between a rabbit and a badger, called the biscacho, which renders travelling dangerous, particularly by night, their holes being so large and deep that a horse is almost sure to fall if he steps into one of them. The biscacho never ventures far from its retreat, and is seldom seen till the evening, when it comes out to feed, and hundreds may be observed sporting round their holes, and making a noise very similar to the grunting of pigs Their flesh is much liked by the people, and they are remarkably fat, and on that account, when caught at any distance from their holes, are easily run down, they will, however, defend themselves from a dog a considerable time The holes of these animals are also inhabited by vast numbers of small owls, which sit, during the day, gazing at the passing travellers, and making a very ludicrous appearance. The parts of the road most frequented by the biscacho are generally overrun by a species of small wild melon, bitter to the taste, whether it thrives particularly on the manure of the animal, or whether the biscacho chooses its hole nearer this running plant, does not seem to have been ascertained."

The viscacha of the Pampas of Buenos Ayres and Paraguay is, when fully grown, as large as our common badger. Above it is a blackish grey, beneath white. The head is large and obtuse, and a whitish band beginning on the nose passes across the face beneath each eye to the root of the ear, producing a sort of crescent-shaped mark when the face is viewed in front. The sides of the lips are furnished with a tuft of thickly set whiskers, composed of long black bristles; and from the angles of the mouth across the cheeks, below the white band, extends a brush of black bristles, stouter than those of the whiskers, but shorter, the lowermost being sharply pointed. This brush reaches the angle of the jaw, forming a beard it does not, however, end here abruptly, but may be traced by bristly hairs intermingled with the fur across the shoulders as far as the middle of the back. The ears are moderate and rounded; the fore-legs are rather slender and short; the hind-legs are long, and the metatarsal portion reminds one of the same part in the limb of the kangaroo, though it is not so disproportionally elongated. At the heel there is a long naked callous sole or pad, before which is a part covered with hair: the toes are three in number, of which

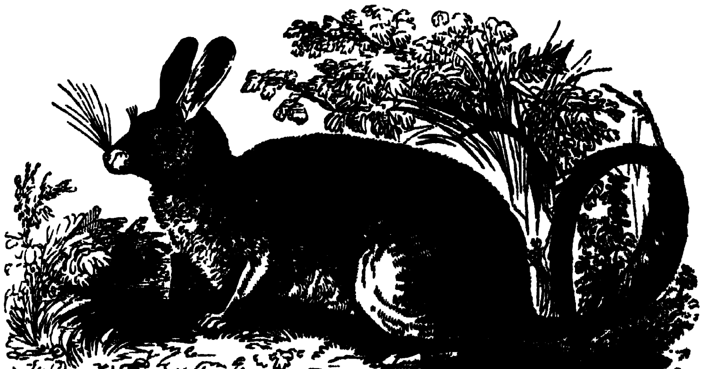


296.—Skeleton of Chinchilla.

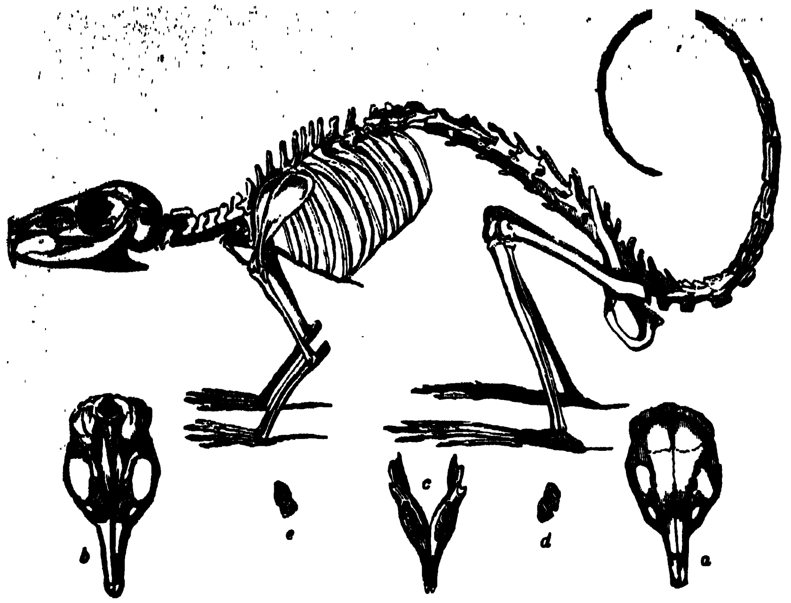
295.—Chinchilla.

297.—Chinchilla.

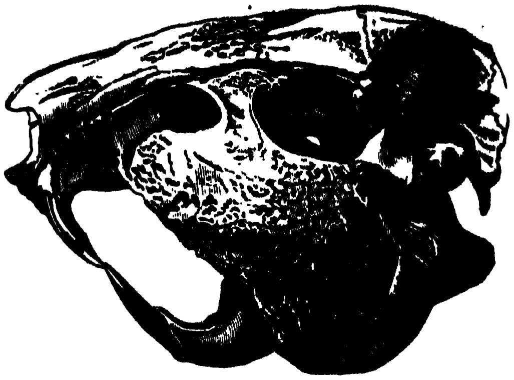
298.—Chinchilla.



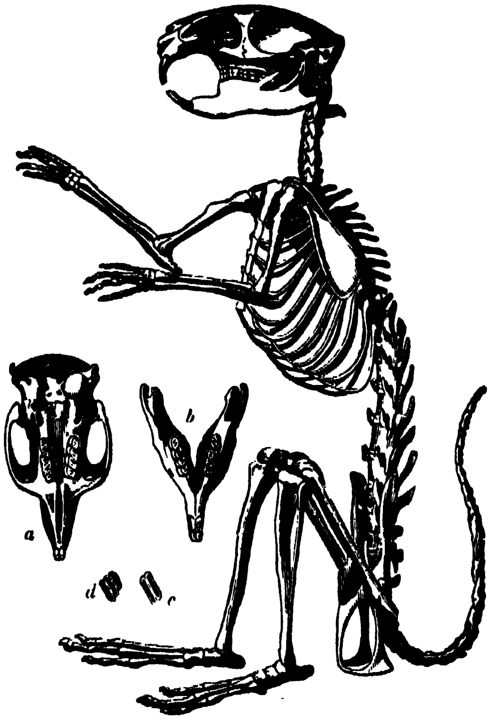
299.—Cuvier's Lagotis.



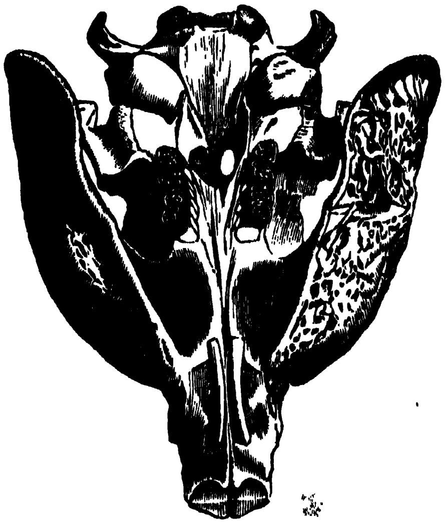
300.—Skeleton and Skull of Cuvier's



303.—Skull of Paca

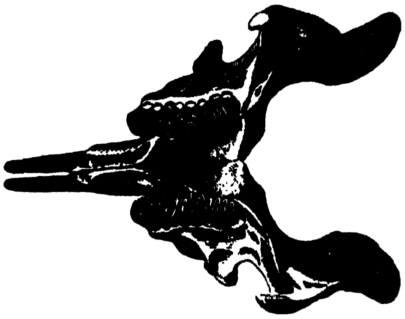


302.—Skeleton of Viscacha.

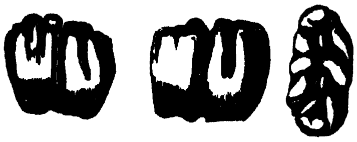


303*.—Upper Jaw of Paca.

306.—Dusky Paca.



304.—Lower Jaw of Paca



305.—Tooth of Paca.

301.—Viscacha.

the middle is the most elongated: all are furnished with strong hoof-like nails, and with naked pads beneath. The tail is rather short, and covered with greyish brown hairs, of which the longest form a fringe on the upper surface: it is generally kept retroverted on the back. The incisor teeth are remarkably large and strong. Fig. 302 represents the skeleton of the Pampas viscacha; *a*, under view of skull; *b*, lower jaw; *c*, crown of the second molar tooth of the left side of the lower jaw; *d*, crown of the last molar tooth of the right side of the upper jaw.

Mr. Brookes's paper on the anatomy of this animal was read before the Linn. Soc. in June, 1828, and published in the Linn. Trans. for the year following.

A small family of the Histricine section, which may be termed Dasyproctidæ, next claims our notice. It embraces two genera, Cælogenys and Dasyprocta. In these genera the molars are $\frac{4-4}{4-4}$, rooted, and bear much resemblance to those of the porcupines; they are crowned with distinct tubercles, which, wearing down with use, give place to winding lines of enamel, set in the interior bony cement.

The genus Cælogenys includes two, or perhaps three, distinct species of Rodents, termed Pacas (a corruption of the word Pag of the Brazilians, or Paig of the natives of Paraguay; and Pakiri of some of the tribes of Guiana).

These animals, the pacas, are remarkable for a curious structural peculiarity in the skull, which imparts a singular aspect to their physiognomy. We give a sketch of the skull of the fulvous paca (Cælogenys fulvus), in profile (Fig. 303), and as viewed on its palatal aspect (Fig. 303*). The peculiarity in question is the immense development of the zygomatic arch, forming an expansive shield of bone, almost concealing the lower jaw, rough and convex externally, and deeply concave within. This broad projecting convex plate has its concavity lined by a continuation or reduplicature of the skin of the face, constituting a sort of pouch, with a narrow linear opening just below the angle of the mouth, and having its edges, from which the pouch leads directly upwards, almost if not quite destitute of hair.

Notwithstanding this narrow orifice, the sac or pouch is so closed, that it cannot be serviceable as the receptacle for food, for neither is the orifice dilatable, nor the pouch, enclosed as the latter is within walls of unyielding bone. The use of this sac is not ascertained: perhaps a secretion of some kind may take place from the subzygomatic fold of skin, but this remains to be determined. Besides the sac described, the pacas have true cheek-pouches of considerable extent, opening from the mouth, and extending down the sides of the neck and below the inferior margin of the zygomatic shield.

The lower jaw, which is almost concealed, is shown at Fig. 304. The characters of the molar teeth, worn by use, are well depicted. Fig. 305 represents the germ of the first molar, before the tooth is completely developed, in three views, namely, the outer aspect, the inner aspect, and the crown with its tubercles. The pacas are animals of considerable size, and of a heavy clumsy figure, having a thick muzzle, with the upper lip deeply cleft; a large inelegant head; prominent eyes, rounded ears and stout limbs, of which the hinder pair exceed in length the anterior—but as the greater portion of the tarsus rests habitually on the ground, the body sinks even lower at the haunches than at the shoulders. The fore-feet are divided into five toes, of which the innermost is a mere rudiment, seated high, and furnished with a small claw. The hind-feet have also five toes, but of these the outermost on each side is small, and seated high: the three central are large, strong, and furnished with powerful hoof like nails. The tail is wanting. The body is clothed with short, stiff, wiry hairs.

306.—The Dusky Paca.

This species, according to Cuvier, is identical with the fulvous paca; but we have examined the skulls, and find them different. In the former the bones of the skull are smooth, and the zygomatic arches less inordinately developed. The general colour of the dusky paca is brownish black, with four lateral rows of white spots, which begin on the shoulders and terminate on the buttocks. The lowest line is almost confounded with the white of the under surface. The sides of the lower jaw, the throat, and chest are also white. Total length of head and body, about two feet; average height fourteen inches. These animals are natives of the whole of the eastern portion of South America, from Surinam to Paraguay, and formerly existed also in some of the islands of the West Indies. Forests in the vicinity of water; wooded, marshy places; and borders of rivers, are their favourite localities: they inhabit burrows, which they excavate, but so superficially, that they are apt to give way beneath the foot of a person passing over them, no less to his annoyance than that of the animal which thus suddenly finds itself in open daylight. These burrows have, as it is asserted, three openings, which the animal conceals with dry leaves and branches. In order to capture the paca alive, the hunter stops two of these apertures, and proceeds to work at the third, till he arrives at the chamber to which the avenues lead. Driven to an extremity, the paca makes a desperate resistance, often inflicting very severe wounds.

When not disturbed, the paca often sits up and washes its head and whiskers with its two fore-paws, which it licks and moistens with its saliva at each ablution, like a cat; and with these fore-paws, as well as with the hind-ones, it often scratches itself and dresses its fur. Though heavy and corpulent, it can run with a good deal of activity, and often takes lively jumps. It swims and dives with great adroitness, and its cry resembles the grunting of a young pig. Its food consists of fruits and tender plants, which it seeks in the night, hardly ever quitting its burrow in the day, the strong light of which, as is the case with other nocturnal animals, is oppressive to its eye: the planter often rues the visits made by these midnight foragers to his sugar-canes. The female is said to bring forth at the rainy season, and to produce but a single young one, which stays a long time with the mother. The pacas are very cleanly creatures in all their habits, and keep their subterranean dwelling in a state of the utmost purity.

It appears that these animals root in the ground with their nose—a circumstance which, taken in conjunction with their voice, a pig-like grunt, the bristly character of their hair, and the flavour of their flesh, probably gave rise, as Mr. Bennett observes, to the comparisons made by the older writers between them and the tenant of the sty. Those which we have seen in captivity were gentle, but certainly not intelligent; and so far we agree with M. F. Cuvier, who observes that when the animal is offended, it throws itself violently at the object which has displeased it, and then makes a kind of grumbling, which at length breaks out into a sort of bark. The greater part of the day it passes in repose, delighting in a soft bed, which it forms of straw, hay, and similar materials, collecting the materials with its mouth, and making a little heap, in the centre of which it lies down. M. Buffon gives a detailed account of one of these animals, which he kept alive in his house for some time, and which was gentle and very familiar.

The flesh of these animals is in great estimation, and in some districts is in ordinary consumption, but as it is fat and rich it is apt to cloy. It is prepared for cooking by being scalded like a sucking-pig and roasted. The fur is of no value, but the skin might be useful if converted into leather. M. F. Cuvier thinks that it would be possible to introduce this animal into our European rural establishments, and that once naturalised it would form no despicable acquisition in the department of domestic economy.

THE AGOUTIS

(*Dasyprocta*, Illig.; *Chlormys*, F. Cuv.). These animals differ from the pacas in the formation of the skull and the conformation of the feet and toes. With respect to the former, the zygomatic arch presents nothing of that strange development so remarkable in the pacas. The toes are distinctly four on each of the anterior feet: of these the outermost toe on each side is small and seated high, while the two middle are long, and armed with stout claws. The hind feet are divided into three toes, furnished with claws of a hoof-like character, and of considerable strength. The limbs are slender, and the hinder pair considerably exceed in length the anterior: hence the pace of these animals is tolerably rapid for a short distance, though they seldom trust to speed for safety, but seek shelter and security in the first hollow tree they meet with, or under a rock. Here they allow themselves to be captured, without offering any resistance, only uttering a sharp plaintive note of alarm. The head of the agoutis is large, the forehead convex, the nose swollen; the ears round, short, and nearly naked; the eyes large and black; the tail is very short, generally indeed a mere tubercle. The hair is glossy and of a wiry character, and annulated in different degrees with black, yellow, or white, and olive green. The molars are $\frac{4-4}{4-4}$, nearly all of the same size, and when worn presenting winding folds of enamel on the flat crowns. It is impossible to convey by mere description an idea of the figures which these convolutions assume, and which vary in proportion to the wearing down of the tooth: we therefore refer to Fig. 307, where *a* and *b* represent respectively the upper and lower jaws. No. 1 represents the teeth when much worn down; 2, the same in an intermediate state; and 3, the same when the tubercles are just effaced, and the surface smoothed down to a level.

The flesh of the agoutis is in some districts highly esteemed, being white and tender.

The agoutis use the fore-paws as hands to convey their food to the mouth, and usually sit upright on their haunches to eat: they frequently also assume the same position in order to look around them, or when they are surprised by any unusual sound or occurrence. Their food is exclusively of a vegetable nature, and consists most commonly of wild yams, potatoes, and other tuberous roots; in the islands of the different West India groups they are particularly destructive to the sugar-cane, of the roots of which they are extremely fond. The planters employ every artifice for destroying them, so that at present they have become comparatively rare in the sugar islands, though on the first settlement of the Antilles and Bahamas they are said to have swarmed in such countless multitudes as to have constituted the principal article of food for the Indians. They were the largest quadrupeds indigenous in these islands upon their first discovery. The same rule of geographical distribution holds good generally in other cases, viz. that where groups of islands are detached at some distance from the mainland of a particular continent, the smaller species of animals are usually found spread over both, whilst the larger and more bulky are confined to the mainland alone, and are never found to be indigenous in the small insulated land.

Though the agoutis use the fore-paws as described, yet they are incapable of climbing trees; and though the nails are strong, they do not burrow, but conceal themselves in hollow trees, among fallen logs and timber in the forest, and similar places of concealment. Here they produce and rear their young, which are born with the eyes closed: they soon become capable of shifting for themselves.

308.—The Common Agouti

(*Dasyprocta Acuti*). This species is very abundant in Brazil and Guiana, and occurs also in Paraguay, where it was observed by D'Azara, who informs us that the Guarinis term it Cotia: in size it is about equal to a rabbit, but it rarely if ever makes a burrow. It frequents densely-wooded districts in preference to open lands, and generally takes up its residence in the hollow trunks of decayed trees, where it remains concealed during the day. This retreat usually serves for several individuals, for it appears to be gregarious, associating in small troops consisting of eighteen or twenty individuals. Its movements are rapid, active, and abrupt, and when chased, it bounds along, like a hare, to gain its accustomed hiding-place: it is however seldom seen except during the night, or as evening begins to sink into twilight.

In Brazil and Guiana the agouti is exposed to wholesale destruction for the sake of its flesh, which is said to be intermediate in flavour between the hare and rabbit; but in Paraguay, according to D'Azara, no one eats it, and M. Moreau St. Méry observes that it has a strange sort of flavour, and is a dish of little relish to the palate. The latter writer also informs us that the agouti is common in the island of St. Lucia, and also inhabits others of the West India group; and that in 1788 several were taken in St. Domingo, which had made a hollow tree their domicile. It is said to breed several times in a year, and to produce from three to six at a birth. The general colour of the agouti is grizzled reddish brown, tinged on the neck, chest, and under surface with yellow. The hairs of the upper and fore parts of the body are annulated with brown, yellow, and black, which gives the animal a speckled yellow and green appearance on the neck, head, back, and sides: on the croup, however, they are of a uniform golden yellow, much longer than on any other part of the body, and directed backwards, concealing the tail, which is a mere naked stump; the moustaches and feet black. The general length of the hair on the upper and anterior parts of the body is about an inch, that of the croup is upwards of four inches long, and all, excepting the short coarse fur of the legs and feet, and that on the breast and belly, is of a stiff, harsh nature, partaking more of the quality of bristles than of simple hair.

The golden agouti differs from the common species principally in its brighter colouring.

309.—The Black Agouti

(*Dasyprocta cristata*). This species, to which the term crested (cristata) is ill applied (since the hairs of the head and neck are not longer than those of the shoulders), is smaller than the common species, but its general proportions and form are the same: it differs, however, in colour, for the hairs of the back and sides, instead of being annulated with various tints, as in that animal, are nearly of a uniform black, whilst the long hairs of the croup are perfectly so. A specimen we regarded as the black agouti, in the Paris Museum, might be thus described:—black, beautifuly freckled with pure white, especially about the cheeks and sides, each hair on those parts being once ringed with white; length twenty inches.

310.—The Acouchi

(*Dasyprocta Acuchi*). This animal differs from the agouti in being of a much smaller size, lighter make, and deeper colour, and especially in having a much longer tail, this appendage measuring two inches: it is very slender, being not much thicker than a crow-quill, and covered with short scattered hairs. Its manners resemble those of the agouti, and it also inhabits the woods of Guiana, but is not by any means so common as that animal. M. D'Azara was mistaken in asserting the acouchi to be identical with the agouti; and it is very obvious that he never saw the former, for, if he had, the distinction could not have escaped his notice, indeed it does not appear to be a native of Paraguay. Specimens of the acouchi, as well as its skeleton, are in the museum of the Zool. Soc. Two living individuals (now the museum specimens alluded to) were described in the 'Proceeds. Zool Soc.' 1830, by T. Bell, Esq., who obtained them from Guiana. "Both individuals," he observes, "are mild and gentle in their dispositions, but somewhat timid they are, however, familiar with their master, and run to him whenever he enters the room in which they are kept, and about which they are allowed to range during the day. Their food is entirely vegetable; they are especially partial to nuts and almonds; they drink but very little. They are extremely cleanly, and take great pains to keep their fur in order, in cleansing which they mutually assist each other. They leap occasionally in play to a considerable height, and frequently, in springing from the ground to an elevation of two feet, descend on the spot from which they rose. Their voice is a short, rather sharp, plaintive pur The individuals, male and female, show great attachment to each other. They frequently agitate their tails with a quick tremulous motion." Mr Bell observes that he had never before the arrival of these individuals seen a specimen of the acouchi, nor was he aware of the existence of even a preserved skin in any English collection. It is the Olive Cavy of Pennant. The general colour is olive mixed with yellow and black. the hairs of the croup are not so long as in the agoutis, and black.

THE CAVIES

(Fam. *Cavidæ*) constitute a group (embracing the genera Cavia, Dolichotis, Kerodon, and Hydrochœrus) which is one of the most distinctly marked in the class Rodentia, and which should not be confounded with that of the pacas and agoutis, the difference being very great, both as respects the conformation of the skull and the characters of the teeth. The molars, as seen in the teeth of the guinea-pig or aperea (Cavia cobaia), Fig. 311, and of the kerodon, Fig 312, may be compared with those of the agouti, Fig. 307, and the wide distinction will be at once appreciated.

The molars are $\frac{4-4}{4-4}$, lamellose, and composite, the folds of enamel enclose triangular or cordiform interspaces. A projecting ridge always occurs on the outer side of the ramus of the lower jaw. In the genus Cavia the anterior feet have four toes, the posterior three; the nails are short and robust; there is no tail. As an example of this genus we may take the common guinea pig, or aperea, the domestic descendant of a species still common in a wild state in various parts of South America. Mr. Darwin, who met with the wild aperea abundantly, states it to be "exceedingly common in the neighbourhood of the several towns which stand on the banks of the Rio Plata. It frequents different kinds of stations, such as hedgerows made of the agave and opuntia, or sand hillocks; and again marshy places covered with aquatic plants, the latter appearing to be its favourite haunt. Where the soil is dry it makes a burrow, but where otherwise it lives concealed amidst the herbage. These animals generally come out to feed in the evening, and are then tame; but if the day be gloomy they make their appearance in the morning. They are said to be very injurious to young trees. An old male killed at Maldonado weighed 1 lb. 3 oz." Mr. Darwin observed that in this animal the attachment of the fur to the skin is very slight. Possessing but little intelligence and very timid, the aperea is nevertheless tamed without any difficulty. Azara, who kept one, remarks that though he took no pains to make it familiar, it manifested no fear when in his presence, and seemed quite unconcerned. It is to this ease with which the wild aperea becomes domesticated that we owe the introduction of it into Europe, for, excepting that it is a very pretty creature, there is nothing to render it a valuable acquisition. It is however eaten by the native tribes of Paraguay, who sometimes capture it by hundreds when, driven from the lowlands by sudden inundations, it retreats for safety to the ajacent hilly grounds, where it finds neither shelterd nor concealment.

Of the genus *Kerodon* we may notice the Rock Kerodon (Kerodon moco, F. Cuv.; Cavia rupestris, Pr. Max). It is a native of the rocky mountain districts in the interior of Brazil. It is less than the aperea, and its fur is very thick and short. The colour is grey mixed with black, and reddish brown above, the under parts being white. A second species, King's Kerodon (Kerodon Kingii), was introduced to science by the late Mr Bennett. It was found by Captain King at Port Desire, on the eastern coast of Patagonia. In size it is less than the aperea, being about nine inches long. Its colour is more uniform than that of the rocky kerodon, and of a deeper tint, a slight dash of white is perceptible behind each ear, and a line of the same tint marks the edge of each branch of the lower jaw. Mr. Darwin states that this Kerodon "is common at intervals along the coast of Patagonia, from the Rio Negro (lat 41°) to the Straits of Magellan It is very tame, and commonly feeds by day. It is said to bring forth two young ones at a birth. At the Rio Negro it frequents in great numbers the bottoms of old edges At Port Desire it lives beneath the ruins of the old Spanish buildings At the Strait of Magellan I have seen amongst the Patagonian Indians cloaks for small children made with the skins of this little animal And the Jesuit Falkner says that the people of one of the southern tribes take their name from the number of these animals which inhabit their country The Spaniards and half-civilized Indians call the kerodon 'Conejos,' or rabbit, and thus has the mistake arisen that rabbits are found in the neighbourhood of the Straits of Magellan.'

313.—The Patagonian Cavy, or Mara

(*Dolichotis Patachonica*, Desm.; *Cavia Patachonica*, Shaw) This large cavy is rare in European museums. A fine specimen, however, is preserved in the British Museum and the Museum of the Zool Soc. It is a beautiful animal, standing high on the legs, with much of the port of some of the bush antelopes of Africa Its height at the shoulder is about a foot and a half. Its length is about two feet six inches, including the tail, which is nearly two inches long It lives on the Pampas south of Buenos Ayres and especially in Patagonia It is noticed by Narborough, Wood, and Byron as being very abundant in Port Desire, and also at Port St Julian, where, however, it does not now appear to exist. It is only where the country has a desert character that this species is common, and in the wilds of Patagonia little groups of two, three, or four may be continually seen hopping after each other in a straight line, over plains of gravel thinly clothed with a few thorny dreary bushes and a withered herbage.

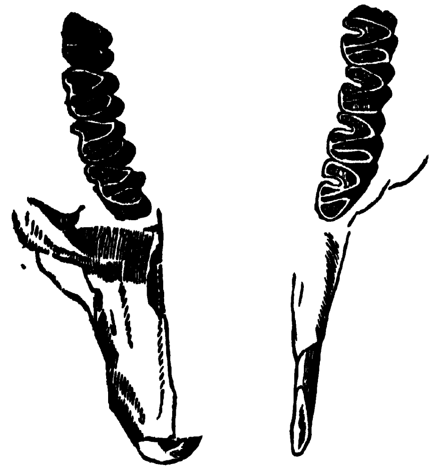
According to Azara, this cavy does not range higher north than latitude 3[illegible]. but in this statement he appears to be mistaken, for Mr Darwin observed that near the coast of the Atlantic its northern limit is formed by the Sierra Tapalguen, in latitude 37° 30′, where the plains rather suddenly become greener and more humid, and he remarks that its limit there certainly depends on this change, since near Mendoza, 33° 30′, four degrees farther northward, where the country is very sterile, this animal again occurs. Azara states that this cavy never excavates its own burrow, but always uses that of the viscacha or biscacha, and Mr. Darwin considers that where that animal is present, Azara's statement is doubtless correct, but that on the sandy plains of Bahia Blanca, where the biscacha is not found this cavy, as the Spaniards maintain, is its own workman The same thing, he adds, occurs with the little owls of the Pampas (noctua cunicularia), which have been described by travellers as standing like sentinels at the mouths of almost every burrow, for in Banda Oriental, owing to the absence of the biscacha, these birds are obliged to hollow out their own habitations. Azara moreover states that, except when pressed by danger, this cavy does not have recourse to its burrow for safety, but crouches on the plains, or trusts to its speed, adding however, that it is soon run down. On the contrary, Mr. Darwin asserts that as Bahia Blanca he repeatedly saw two or three animals sitting on their haunches by the mouths of their holes, which they quietly entered as he passed by at a distance. He remarks, however, that, different from most burrowing animals, they wander, commonly two or three together, to miles or even leagues from their home, and he was not able to ascertain whether or not they returned at night. This species is diurnal in its habits, roaming about by day. It is very shy and watchful, seldom squats after the manner of a hare, and cannot run fast, so that indifferent dogs easily overtake it. The female breeds in her burrow, generally producing two young ones at a birth. The flesh of this animal is white, but dry and insipid. The skin with the fur on is in esteem, being used for rugs, and is beautiful from the character of the hair, which is full and soft, and from the tasteful arrangement of the marking. The colour of the back is brown, grizzled with white, verging into yellow on the sides of the body and on the limbs, but becoming black as it approaches the haunch this dark hue is there abruptly interrupted by a white band passing transversely above the root of the tail, and spreading on the back and sides of the thighs The appearance of this white mark is very striking The chest, inside of the limbs, and under part of the body are also white. The ears are three inches and a half in length, erect and pointed. Full-grown individuals weigh between twenty and twenty-six pounds The young, it is said, may be easily domesticated.

314.—The Capybara

(*Hydrochœrus Capybara*). Cabiai, Buff. The Capybara (the only known species of the genus Hydrochœrus) is the largest of all the Rodentia, and its size, its massive, heavy proportions, its thick head, and the bristly character of its hair, give it a degree of resemblance to some of the Pachydermata Marcgrave regards it as a sort of aquatic hog, Fermins, in his 'History of Surinam,' 1775, terms it Porcus fluviatilis, or river-hog, while Pennant gives it the title of thick-nosed Tapir. It is also the Cochon d'eau of Desmarchais, the Sus maximus palustris of Barrère, and the Sus hydrochœrus Pig-like as the capybara may be in its external aspect, it is nevertheless a genuine Rodent, as much so as the hare or agouti. Its dentition consists of the usual incisors, which are of prodigious size and strength those in the upper jaw have a deep longitudinal furrow on their outer surface. The molars are four on each side, above and below; and consist of a series of obliquely transverse, parallel laminæ of enamel (Fig. 315), presenting acute lateral projections in the three first teeth: these projections are on the outer edge of the upper teeth and the inner edge of the lower. The spaces enclosed by the layers of enamel are filled in with osseous matter, and the whole is united into a single mass by intervening cortical matter, or crusta petrosa. The molars of the capybara are in fact analagous to those of the elephant.

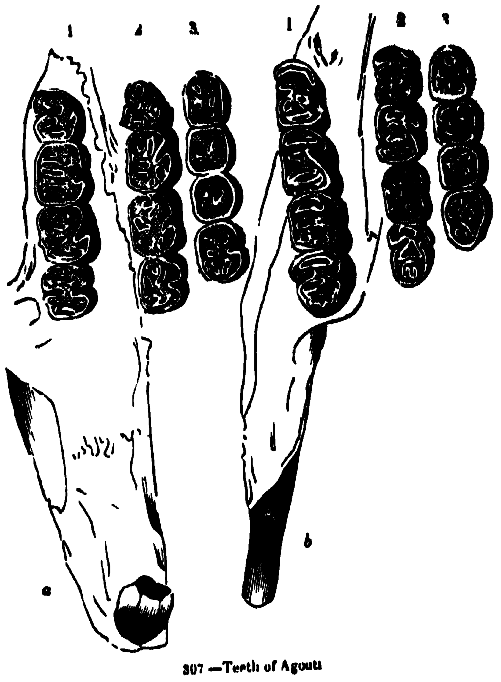
We have stated that in some Rodents the fauces, or back of the mouth, is continued funnel-shaped, opening into the œsophagus through a small orifice surrounded by a muscle of circular fibres, allowing only the gradual transmission of food which has been previously reduced to a thorough pulp This structural peculiarity was first pointed out in the capybara by Mr Morgan ('Linn. Trans.' vol xvi.), but we meet with it also in the Coypu, the Capromys, and the Beaver. (See 'Proc Zool. Soc.' 1832, p 73, 1835, p 175) In the capybara the head is large, the muzzle thick and blunt, the upper lip deeply fissured, the eyes are moderately large. the ears small and rounded The naked patch of the size of half a crown occupies the cheek a little below each eye. The fore-limbs are short and muscular, the toes being four, furnished with strong claws, the hind-limbs are also thick, but longer than those before, and the whole of the sole, which is covered with naked rough skin, is applied to the ground. The toes are three in number, having strong large hoof-like nails, and being partially connected together by intervening membranes The tail, a mere rudiment, is scarcely to be perceived. This animal exceeds three feet six inches in length, and its body, which is more than three feet in girth, owing to its bulk and the shortness of the limbs, almost touches the ground It is covered with long, coarse thinly-set hairs of a sandy or brownish grey. A fine specimen, recently living, is preserved in the Museum of the Zool. Soc.

The capybara is a gregarious animal, frequenting the rich and wooded borders of the lakes and rivers in Brazil, Guiana, and Paraguay. Mr. Darwin states that it is common wherever there are large rivers or lakes, over that part of the South American continent which lies between the Orinoco and the Plata, a distance of nearly 1400 miles. They are not generally supposed to extend south of the Plata, but he heard that there were capybaras (provincially termed Laguna Carpincho) high up the Salado, and presumes that they have sometimes been seen south of the former river. This animal lives usually in small companies, which remain concealed among the thickets and dense herbage of the borders of the water during the day, and wander forth at night to feed. When alarmed, the capybara utters a loud cry like the vowel sounds *a pé*, and immediately makes for the water, into which it



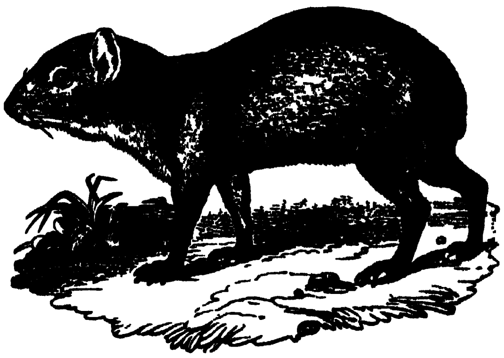
311.—Teeth of Guinea-Pig

308.—Common Agouti.

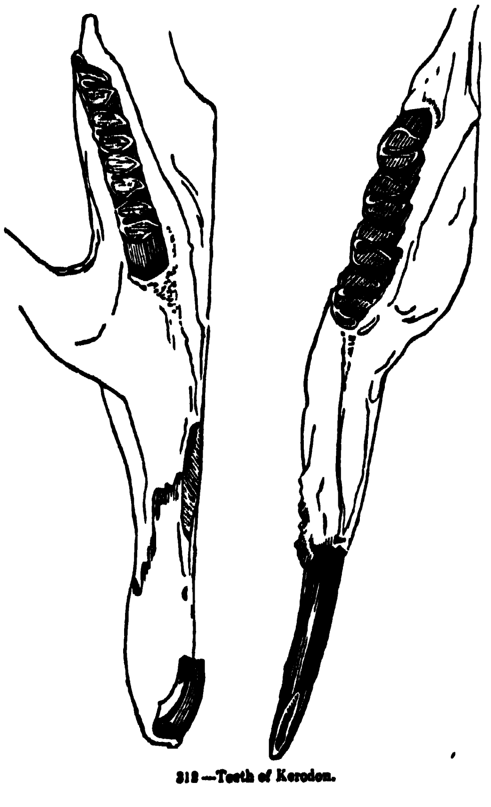


307.—Teeth of Agouti

310.—Acouchi.



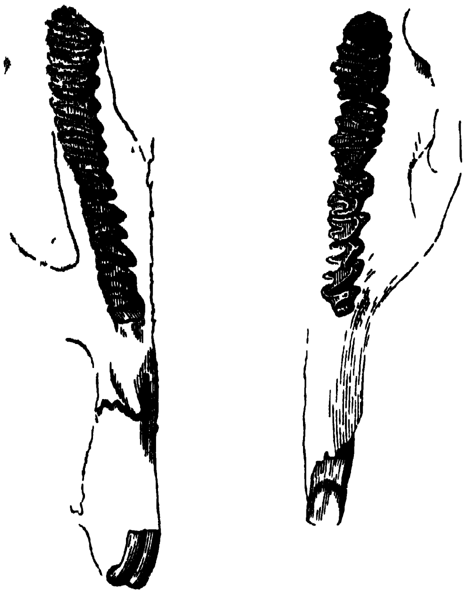
309.—Black Agouti.



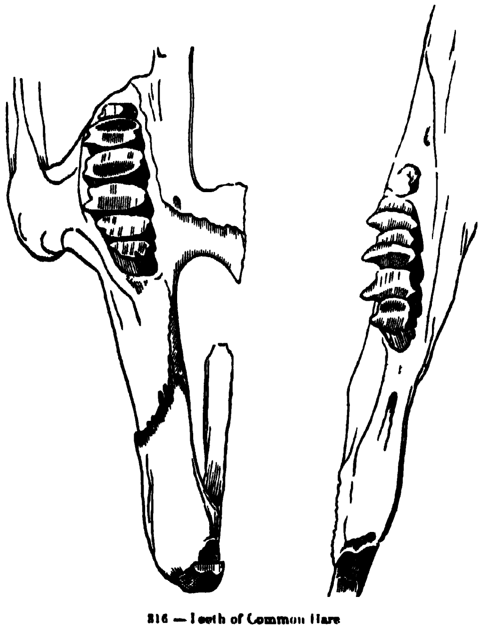
313.—Teeth of Kerodon.

312.—Patagonian Cavy.

314.—Capybara.



—Teeth of Capybara



316.—Teeth of Common Hare

320.—Dwarf Pika.

8.—Rabbits.

317.—Common Hare

319.—Syrian Hare.

plunges, swimming with great ease and quickness, little more than its nose appearing above the surface. If hard pressed or wounded, it dives in order to baffle its pursuers, and then endeavours to gain a more secure place of concealment. It is eagerly hunted for the sake of its flesh, which is accounted good, though of a musky flavour: the hind quarters are made into hams. Of its natural enemies the terrible jaguar is the most formidable: this powerful beast steals upon the capybara by surprise, and destroys numbers. The food of the capybara consists exclusively of grass and vegetables, as water-melons, gourds, &c. Azara does not believe that these animals ever frequent salt-water: Mr. Darwin shot one in the bay of Monte Video, an old female, measuring, from the tip of the snout to the end of the stump-like tail, three feet eight and a half inches, in girth three feet two inches, and weighing 98 lbs. Several also were seen by the officers of the Beagle on the island of Guritti, off Maldonado, where the water is nearly as salt as in the sea.

On the banks of the Apure, Humboldt saw the capybara, which he calls Chiguira, in troops of fifty or sixty. He notices the ease of the capybara in the water; and states that he saw with surprise the animals, affrighted by the approach of a boat, dive and remain from eight to ten minutes under water. On the Apure, Arauco, &c., and in the vast savannahs of the Llanos, the animal is said to be often seen in droves of a hundred. They there browse upon a sort of grass called chiguirirero.

The common posture of the capybara when at rest is sitting upon the haunches, the soles of the hind-feet being applied flat to the ground, like the agouti, the viscacha, and many others of the Rodents. The female breeds once in a year, and brings forth from four to six or seven at a birth, having prepared a snug bed of dried herbs and grasses.

The Family Leporidæ contains the hares and rabbits (Lepus), and the pikas (Lagomys). This family is well marked in its characters, comprehending only two genera, of which one, the genus Lepus, is widely distributed, though it has the most representatives in North America, where the number of species already discovered is equal to that of all the rest found in the other portions of the globe taken together.

317.—THE COMMON HARE

(*Lepus Timidus*). Λαγὼς (Lagos) of the Greeks; Lepus of the Latins; Lepre and Lievora of the modern Italians; Liebre and Lebratello of the Spaniards; Lebre and Lebrimho of the Portuguese; Lièvre, French; Has, Haas, and Hase of the Germans; Haas and Haze of the Danes; Hara of the Swedes; Hara of the Anglo-Saxons; Ysgyfarnog, Ceinach, of the Ancient British.

In the genus Lepus, behind the ordinary incisors of the upper jaw are two more of a much smaller size: the molars, the small posterior one excepted, are composed of two vertical plates soldered together. Dental formula:—Incisors, $\frac{4}{2}$; molars, $\frac{6-6}{5-5}$ (see Fig. 316). The ears are long; the eyes large; the tail short and turned upwards; five toes before, four behind; feet and toes hairy beneath.

Few animals are better known than our common hare, which is spread over the great portion of Europe, and appears to be indigenous in our country: but the ancient Britons abstained from eating its flesh on religious grounds. This species probably extends into Asia. Mr. M'Clelland states that it occurs in Assam, but is of degenerate size, measuring only from seventeen to nineteen inches, instead of twenty-one. "It is not esteemed there an article of food. The ears are more uniformly grey than in the European variety" ('Proc. Zool. Soc.,' 1839). We suspect the Assam hare to be a distinct species. Timid and defenceless, and surrounded by numerous enemies, the hare is yet well endowed with the means of self-preservation. It is watchful and swift; and its brown fur assimilates in colour with the russet herbage among which it most makes its form. All are acquainted with the external characters of the hare, and with its habits, of which it is useless to give minute details.

The hare swims well, and takes fearlessly to the water. We have known them cross a broad and rapid stream; and Mr. Yarrold (see 'Loudon's Magazine,' vol. v.) gives an account of one which in the morning at high water came down to the sea-shore, and crossed over to an island a mile distant from the mainland.

Wild and timid as the hare is, it is not unsusceptible of domestication. The poet Cowper, as is well known, kept tame hares; and many other instances might be enumerated.

The hare breeds when about a year old, and produces two or three broods in the course of the spring and summer; but the males and females do not form permanent associations. The female, after about thirty days' gestation, brings forth from three to five young. These are born covered with fur, and with the eyes open; and in about a month they leave their parent and shift for themselves. The leverets, as the young are termed, are the prey of stoats, weasles, polecats, owls, and hawks.

Besides the common hare, the Alpine or varying hare inhabits certain districts of our island, namely, the northern parts of Scotland. This species (Lepus variabilis) is common in the mountain districts of Sweden, Norway, Lapland, and in the Alps. It is occasionally seen on the mountains of Cumberland.

The Alpine hare is intermediate in size between the rabbit and the English hare. In Sutherlandshire and other parts of the Scottish highlands it tenants the summits of the mountains, hiding in the clefts of rocks or among rocky fragments. During the winter lichen is its staple food. At this season it descends to a lower and less exposed station; and its fur, gradually losing the light fulvous grey of summer, becomes of a snowy white, the tips of its ears (which are shorter than the head) remaining black.

The common hare of Ireland (Lepus Hibernicus) is again distinct from the common hare of England. The distinguishing characters between the two were first pointed out by Mr. Yarrell. (See 'Proc. Zool. Soc.' 1833, p. 88.)

Though somewhat larger than the English species, its head is shorter and more rounded; its ears still shorter than its head, and its limbs less lengthened. The fur also differs greatly in its quality from that of our common hare, and is useless as an article of trade.

318.—THE RABBIT

(*Lepus Cuniculus*). Coney, Anglicé; Coneglio of the Italians; Conejo, Spanish; Coelho, Portuguese; Koniglein and Kaninchen, German; Konin, Dutch; Kanin, Swedish; Kanine, Danish; and Cwningen of the Welsh.

Size excepted, the rabbit closely resembles the hare in all its principal characters. It, may, however, be at once distinguished by the comparative shortness of the head and ears, as well as of the hinder limbs; the absence of a black tip to the ears; and by the brown colour of the upper surface of the tail. Its habits and general economy are totally opposite to those of the hare; and its flesh, instead of being dark and highly flavoured, is white, and, though delicate, somewhat insipid, especially that of the tame breed. The flesh of the latter is indeed preferred by some, but we agree with M. Ude in thinking it very inferior.

It would appear that the rabbit is not an aboriginal of our island, but the date of its introduction is unknown. In the year 1309, at the installation feast of the Abbot of St. Austin's, six hundred of these animals were provided, at the then great cost of 15*l.*; the price of each, sixpence, being that of a pig. It is generally believed that the rabbit was first introduced into Spain from Africa by the Romans, whence it gradually spread, naturalising itself in temperate climates.

This animal is eminently gregarious; and, as is well known, makes extensive burrows, in which it habitually dwells and rears its young. Sandy soils, with a superficial layer of fine vegetable mould clothed with thyme, fine grass, and other herbage, which at the same time afford food and are easily mined, are favourable spots for the increase of the rabbit. They delight in steep sandbanks overhung with brushwood and furze; and we have remarked that when the old red sandstone crops out and is rendered friable, or somewhat decomposed by the action of the atmospheric elements, rabbits are very numerous, burrowing with great facility. They abound also in woods, especially such as clothe the declivities of hills, whence, like the hare, they make incursions into the adjacent corn-lands. A rabbit-waren, that is, a wide sandy heath, or extensive common, devoted to their increase and feeding, when visited at the close of day or by moonlight, affords an amusing spectacle. Hundreds may be seen of all sizes, gambolling and sporting, and chasing each other with astonishing rapidity. When alarmed, they take to their burrows, disappearing as if by magic.

The female is capable of breeding at six months old; and four or five litters, consisting each of about five young, are annually produced. We have stated that the hare produces her young clothed, capable of seeing, and soon in a condition to shift for themselves. With the rabbit, circumstances are widely different. The young are born blind, and naked, and totally helpless. The female forms a separate burrow, at the bottom of which she makes a nest of dried grass, lining it with fur taken from her own body. In this nest she deposits her young, carefully covering them over every time she leaves them. It is not until the tenth or twelfth day that the young are able to see; nor do they leave the burrow till four or five weeks old.

The wild rabbit is undoubtedly the origin of our various domestic breeds. Tame rabbits indeed easily resume their natural state of freedom, and return to their instinctive habits. Albinoes are common in a state of domestication, and it often happens that one or two appear in a litter when neither of the parents are so.

319.—THE SYRIAN HARE.

According to Desmarest, the common hare of Europe exists in Greece, Asia Minor, and Syria. It is, however, very probable that the Egyptian hare (Lepus Ægyptius) extends into the latter region. It differs from the European species principally in the greater proportionate length of its hind limbs and ears.

320.—THE DWARF PIKA

(*Lagomys pusillus*). The Calling-hare of Pennant; Semlanoi Saetshik, or Ground-Hare, of the Russians about the Volga: Tschatsohat or Ittsitskan, Barking Mouse, of the Tartars; Rusla of the Calmucs.

In the genus Lagomys the muzzle is acute; the ears short and somewhat rounded, and the soles of the feet hairy; the tail is wanting. The dental formula approaches that of the genus Lepus:—Incisors, $\frac{4}{2}$; molars, $\frac{5-5}{5-5}$. The genus Lagomys is widely distributed, though the species described are not numerous. About five are known, and of these three are natives of the rocky deserts of Tartary and Siberia; the fourth is a native of the Himalaya Mountains; a fifth of the Rocky Mountains in the high northern regions of America, from latitude 52° to 60°.

The pikas are pretty little animals, with something of the manners of our rabbits, and dwell in burrows, which are artfully concealed.

The dwarf pika, or calling-hare, measures little more than six inches in total length. It has the head longer than usual with hares, and thickly covered with fur, even to the tip of the nose; numerous hairs in the whiskers; ears large and rounded; legs very short; soles furred beneath; its whole coat very soft, long, and smooth, with a thick, long, fine down beneath, of a brownish lead colour: the hairs of the same colour, towards the ends of a light grey, and tipped with black; the lower part of the body hoary; the sides and ends of the fur yellowish. Weight from three and a quarter to four and a half ounces; in winter scarcely two and a half ounces.

The dwarf pika, or calling-hare, is found in the south-east parts of Russia, and about the mountain ridge spreading from the Ural chain to the south; it also frequents the borders of the Irtish and the west part of the Altaic chain, but occurs nowhere in the east beyond the Oby.

These animals delight in sunny valleys and the declivities of hills, where food is plentiful, and especially where woods or forests afford them a refuge in time of danger. They dig deep and intricate burrows, the openings of which are not above two inches in diameter, and are usually formed beneath the concealment of a bush, in situations abounding with thickets and underwood, and with the various shrubs and grasses upon which they feed. They lead for the most part a solitary life, sleep during the day with unclosed eyelids, like the hare, and emerge from their retreats at night, in search of food, which principally consists of the bark of the young bushes, flowers, buds, and grass. They form no winter store, but during the inclement portion of the year, still continue to seek out, by excavating tracks beneath the snow, their accustomed fare, and they are frequently subjected to severe privations and even death, in consequence of a deficiency of their favourite plants. They drink often when they happen to be near water, but can exist with very little. The females produce at each litter five or six young, which are born blind, helpless, and without fur; but in eight days they acquire sight, are covered with hair, and begin to enjoy the use of their limbs.

The most obvious peculiarity of these pikas is ther voice, from which they have acquired their trivial name. Its tone is so like that of a quail, that it is often mistaken for it even by the inhabitants of their native districts. It is heard only in the morning and evening, except in dark and cloudy weather, and is repeated five or six times by each animal at regular intervals, and is loud and sonorous. Both the male and female utter this note, but the latter is silent for some time after she has brought forth her young, which takes place in the month of May.

The pikas are exceedingly gentle. Pallas states that they will acquire confidence and become tame in the course of a day after captivity. They sit in a crouching posture, like the chinchilla, and are extremely cleanly, frequently rubbing their faces with their fore-paws after the manner of rabbits, and scratching their fur with their hinder claws. They run by short leaps; and sleep stretched out at full length.

ORDER PACHYDERMATA.

This term Pachydermata was given to the present order by Cuvier, and refers to the thickness of the hide so generally conspicuous in the animals it comprehends; such, for example, as the elephant, hippopotamus, rhinoceros, hog, &c.

On looking at the order Pachydermata as a whole, we find it for the most part composed of a genera between which there is a want of that intimate relationship which gives us an idea of unity or completeness. We see chasms in the gradation of existing forms, and are forced, as it were, by abrupt transitions from one genus to another, instead of passing through an intermediate series. Yet we are not rashly to infer the original plan and purpose of nature to have been destitute of unity. Far from it: happily the researches of the geologist have brought to light the fossil relics of many species, the extinction of which at some remote epoch has left blanks in the series—blanks, however, which we are thus enabled to fill up. And as these researches are continued and extended, we have reason to conclude that every hiatus caused by the absence of intermediate forms will become occupied. In the present order, indeed, the fossil relics of extinct species are peculiarly valuable and interesting: among them are found not only the fossil remains of animals allied to existing species, as the fossil elephant or mammoth, fossil rhinoceroses, and others, but also of animals which have now no living representatives, and which constitute the types of distinct genera, comprehending exclusively beings whose characters are to be drawn only from their recovered relics, they themselves having been long blotted out from among the "things that be." Such are the Mastodon, the Anaplotherium, the Palæotherium, the Toxodon, the Dinotherium, and many more.

The order Pachydermata is divided by Cuvier into three sections: the first (Proboscideans) includes the elephants and the extinct Mastodon; the second (ordinary Pachyderms), the hippopotamus, tapir, rhinoceros, and hog,—the Anaplotherium, Palæotherium, and many other extinct forms; the third (the solidungulous Pachyderms) includes the horse and ass. To these we may add a fourth, namely, the aquatic, represented by the Dugong, Lamantin, &c.

We shall commence our review of the Pachyderms with the history of the elephant; of which gigantic beast our pictorial museum is replete with specimens.

321.—The Elephant.

Two species of elephant are at the present day in existence, viz., the Indian elephant (Elephas Indicus), Figs. 321, 322, 323, 339, 340, and the African Elephant (Elephas Africanus), Figs. 324, 336.

To the distinguishing characters between these two species we will first attend.

The Indian Elephant is characterised by the elongation or pyramidal elevation of the skull (Fig. 327), the concavity of the forehead, the moderate size of the ears, and the parallel narrow transverse ribands or lines of enamel with indented edges which traverse the crown of the grinders. This character is well displayed in Fig. 330, of which *a* represents the upper molar tooth, and *b* the lower molar tooth of that species. The number of toes on each foot is really five, but of the hind-toes four only are indicated by hoofs, the fifth being buried within the dense skin. The tusks of the female never acquire the size of those of the male. The male attains to the height of 8, 9, or 10 feet at the shoulder. This animal is a native of India, Cochin-China, Siam, Pegu, Ava, the island of Ceylon, and other large islands, as Borneo and Sumatra.

The African Elephant is distinguished by the rounded figure of the skull (Fig. 328), by the magnitude of the ears, which spread over the shoulders, and by the lozenge-shape assumed by the lines of enamel traversing the grinders. The figure of these lines is well represented by Fig. 331, of which *a* represents the surface of the upper grinder; *b*, the lower grinder; *c*, the original state of the grinders, when the laminæ of which they consist are free, that is, as yet uncemented together; and *d*, the laminæ as they are attached in parallels one to the other by cortical substance, in a more developed state of dentition, but before the crown of the tooth has been worn by mastication, and when it only presents on its surface blunt tubercles. To the structure of these teeth we shall have occasion to refer again.

The tusks in the African Elephant are often of huge size, and almost as large in the female as in the male. The toes are really five, but four only on each anterior foot, and three on each hinder foot, are indicated externally by hoofs. In the present day this species is confined to the remoter regions of the African continent.

We shall now proceed to a few general remarks on the structure and organization of the Elephant, applicable to both species.

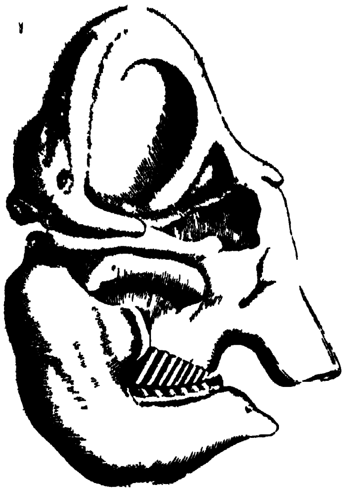
There is something, it must be confessed, noble and imposing in the appearance of the elephant; and especially when viewed in front (see Fig. 343). Its colossal bulk, its vast powers, and the peculiarity of its form and proportions, render it conspicuous among the crowd of terrestrial animals. Its dignity, however, is the dignity of strength and stature; there is no grace in its contour, but every part is heavy and massive. The huge body is supported on four pillars, for such the limbs appear, the bones of which bear perpendicularly on each other (see skeleton, Fig. 341), while a towering head of vast size seems to rise at once from the shoulders, without the intervention of a neck. The vertebræ of the neck (Fig. 341) are indeed seven, as is the general rule in the class Mammalia; but instead of being elongated, as in the ox, deer, or antelope, they are compressed into a short space,—for strength and firmness are required. How, indeed, could the ponderous head of this animal be supported were the neck to be modelled upon a plan of slender elegance? Independent of the ivory tusks, the weight of the skull itself is very great: we have seen four strong men labour in carrying one of moderate size; but the tusks make a considerable addition. Those of some of the Indian elephants vary from 70 to 100 lbs. each; but those of the African species are far heavier. Hartenfels, in his 'Elephantographia,' gives a table of the weight and length of the most remarkable upon record, with his authorities; among others, one is stated to have weighed 325 lbs. Camper, who possessed one weighing 105 lbs., notices one sold at Amsterdam, the weight of which was 350 lbs. Well, then, may the head appear as if destitute of a neck when we consider the load to be sustained. The shortness, however, of the neck (setting aside the projecting tusks, which of themselves would form an insuperable obstacle), prevents the elephant from applying his mouth to the ground; neither can he browse on the foliage of the trees like the giraffe, for the position and formation of the mouth forbid the attempt. (See Fig. 342, the head of the elephant with the proboscis upraised, showing the mouth.) But to atone for the shortness of the neck, and those harmonious concomitants of structure which exclude this animal from the pale of those that on the one hand graze, and on the other browse, the elephant is provided with an organ which more than supplies every deficiency; we allude to the proboscis—an instrument in every respect of essential importance in this creature's economy.

The proboscis of the elephant must not, however, be regarded exactly in the light of a new organ: it is a modification of the structure of the upper lip and nose; and though in the elephant this is carried out to its maximum, still we find an analogous but short proboscis in the tapir, nor are traces of it lost in the rhinoceros, which has the upper lip capable of being protruded, and endowed with considerable powers of prehension. If we turn to the skull of the elephant (Fig. 329, section of a skull; *a*, the opening of the nostrils), we find the nasal orifice not only large, but appearing as if situated in the forehead, in consequence of the situation and development of the alveoli (sockets) in which the bases of the huge projecting tusks are imbedded. From the nasal orifice is continued the proboscis of the elephant, in the form of an elongated cone: in its anterior aspect it is rounded, and the coarse skin which covers it is furrowed by transverse wrinkles very apparent when the animal contracts the proboscis, but which almost disappear when it is protruded to the full stretch. The under surface is flattened, with a rough projecting margin on each side, producing in some degree a similarity to the legs of a large caterpillar. Flexible to an extreme, and possessing an amazing strength, this organ consists of bundles of muscular fibres, disposed, some longitudinally, others transversely, in various directions crossing each other, and diverging from two nasal canals separated from each other by a tendinous partition, and lined with a mucous membrane over which nerves are abundantly distributed. Fig. 344 shows a section of a portion of the proboscis or trunk of the elephant admirably illustrative of its structure:—A. Horizontal section, in which we see the small transverse muscles cut—some (*a*) across: others (*b*) in their length. B. Vertical section in length, which has divided the nasal canal on the left side. The small transverse muscles, which are seen in their length at *b*, are cut across at *c*;—other small muscles of the same kind are seen at their length at *d*. We see in their length, at *e*, the antagonist of these transverse muscles—that is, the small longitudinal muscles. C. Vertical section across. The small transverse muscles are seen in their length. They have various directions, not precisely radiating from the axis to the circumference, though their course is always across. They are all within the bed of the small longitudinal muscles which the section has divided across. The principal nerves and blood vessels are also shown in this section; as also the two canals of the trunk.

It is to this multiform arrangement of its muscles (and according to Cuvier their number is about forty thousand), all of which are under the will, that the proboscis of this animal owes its flexibility. It can be protruded or contracted at pleasure, raised up or turned to either side, coiled round on itself or twined around any object. With this instrument the elephant collects the herbage on which he feeds and puts it into his mouth; with this he strips the trees of their branches, or grasps his enemy and dashes him to the ground. But this admirable organ is not only adapted for seizing or holding substances of magnitude; it is also capable of plucking a single leaf, or of picking up a straw from the floor. The orifices of the canals of the extremity are encircled by a projecting margin, produced anteriorly into a finger-like process endowed with a high degree of sensibility and exceedingly flexible. It is at once a finger for grasping and a feeler; the division between the two nasal orifices or their elevated sides serves as a point against which to press; and thus it can pick up or hold a small coin, a bit of biscuit, or any trifling thing with the greatest ease. Figs. 345 - 351 will serve better than words to convey a clear idea of the structure of the termination of the trunk, and of the modes in which the animal uses it. Figs 346 and 347 show the difference of form in the termination of the trunk of the male and female. As the elephant feeds himself by means of his proboscis, so he drinks by the same means also. The young elephant takes its mother's milk in the ordinary manner; but in order to drink, the animal dips the extremity of the proboscis into the water, and sucks up the fluid, so as to fill the two canals; it then inserts the extremity into the mouth, and discharges the contents. And here it may be observed, that at the upper part of the canal, just anterior to the nasal orifice of the skull, there exists a moveable cartilage so disposed as to lead to the conclusion that it acts as a valve in preventing the water when sucked up from passing through the posterior nares into the throat, which would be the case but for some remedial contrivance. The elephant can retain the water taken into his proboscis as long as he pleases, and discharge it either gently or with great violence: he does the latter, when throwing it over his own body to cool himself, or when in playfulness or anger he discharges it against any bystander. Through this trunk, the shrill trumpet-like noise which the elephant often utters, and which is an expression of satisfaction, is produced.

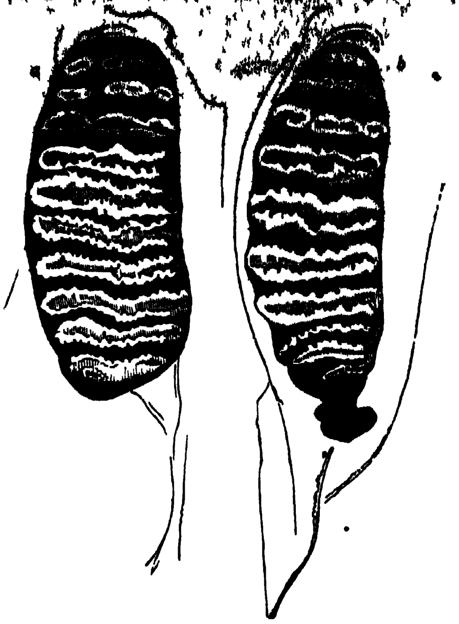
If we turn to the skeleton of this huge beast, its solidity will not fail to strike us. We shall not here enter into minute details; we may, however, state that the head of the thigh-bone is not bound to the socket by the ligamentum teres: this peculiarity exists only in the orang, the sloth, the seal, the enhydra, the walrus, and the ornithorhyncus, and in the present animal. The skull of the elephant is altogether extraordinary, and presents us with a vast frontal elevation, which gives it an air of great dignity, but, as we shall see, the appearance is deceptive. *Fig 329*, which represents *a vertical section* of the skull, may be here consulted. Before and above the cranial cavity *c* the two tables of the skull are separated from each other by a series of irregular cells (the frontal sinuses carried to an extreme) *b b*: whence it follows that the anterior and upper portion of the skull is more advanced and elevated than the development of the brain itself warrants. We read of instances in which many balls have been lodged in the head of the elephant without bringing him down, and the reason is obvious: they entered the vast region of cells, and did not touch the brain; and to this circumstance is to be attributed the miserable failure of the attempt made some years since to shoot an infuriated elephant then existing at Exeter Change. A skilful elephant-hunter would have saved the poor animal from protracted torments and a lingering death. In the dentition of the elephant we find much analogy to the order Rodentia, and among them especially to the Capybara. The teeth of the elephant consist only of molars, and of incisors, or, as they are commonly called, tusks, which occur only in the upper jaw. The molars are of a compound structure, consisting of transverse folds of enamel, each fold enveloping a central nodule of bone, with an external coat of a different character, called cortical substance, or crusta petrosa, compacts the whole together. Thus a single grinder may be regarded as made up of a certain number of distinct teeth bound up into one mass. The process by which these separate constituents of the molars are deposited and arranged in the capsule is admirably described by Cuvier, in his 'Ossemens Fossiles,' to which work we refer those who wish to investigate the subject (see vol. i. p. 31).

The molars of the elephant when perfected are not permanent, but are shed in due succession for six or eight times, perhaps oftener, and this not from the rising up of a fresh tooth below the one it is to succeed, but by the rising up of a new one behind

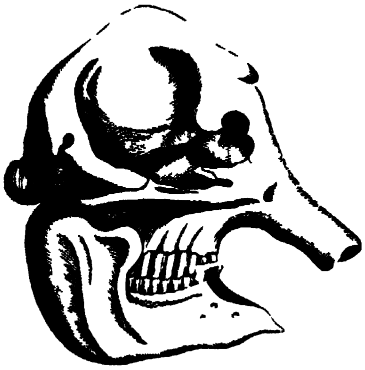


3[illegible] —Skull of Indian Elephant

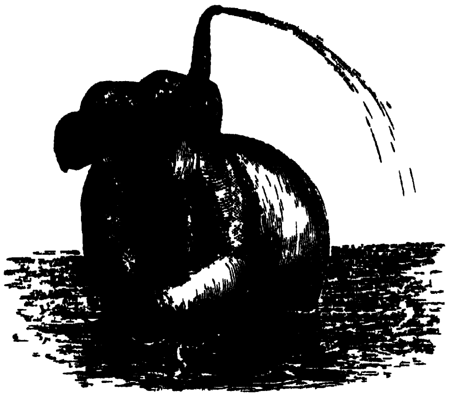
321 —Asiatic Elephant.



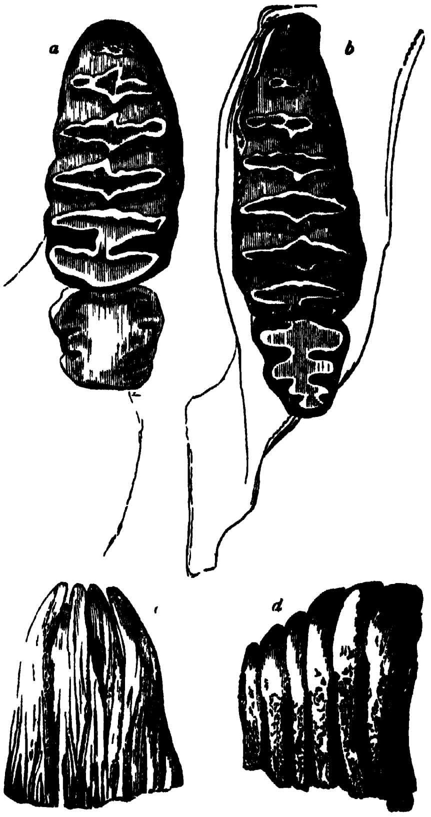
330 —Teeth of Asiatic Elephant



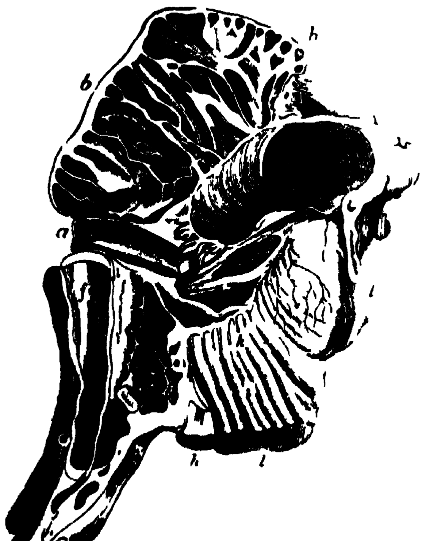
328 —Skull of African Elephant



322 —Elephant of the Jardin des Plantes

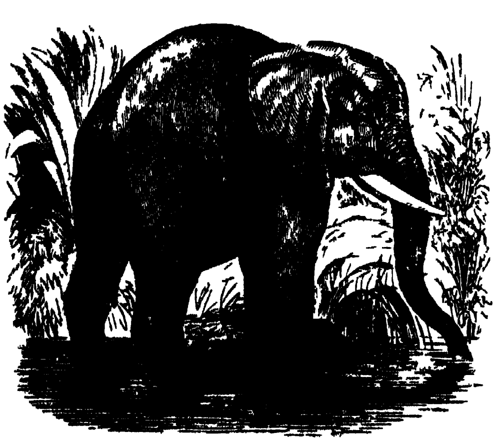


331 —Teeth of African Elephant.



3[illegible]9 —Section of Skull of Indian Elephant

[illegible] Elephant



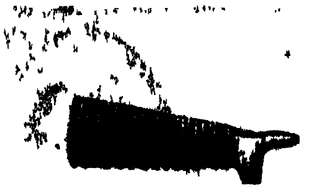
324 —African Elephant.

325 —Elephant browsing.

326 —Young Elephants browsing.

343 —Head of Elephant

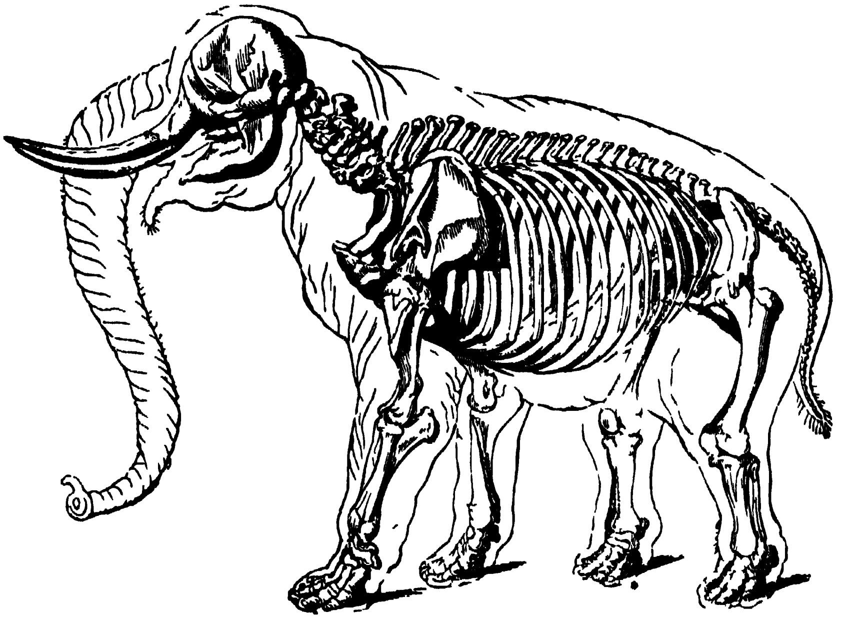
337 —Elephant lying down.



345.—End of Elephant's trunk (profile)

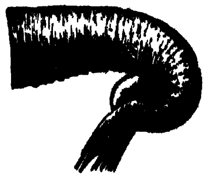
348.—Proboscis in gathering long herbage

342 —Head of Elephant with proboscis upraised



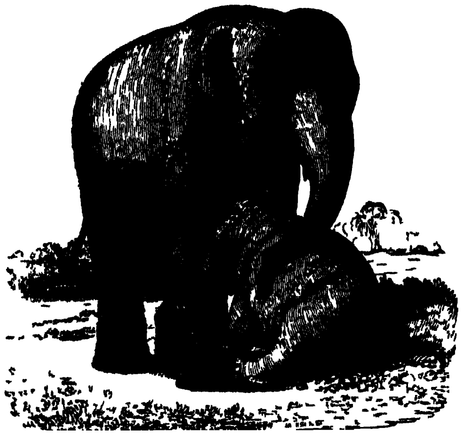
341.—Skeleton of Elephant

350 — Mode of holding a root

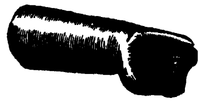


351 —Curled action when much force is required

349 —Herbage when gathered

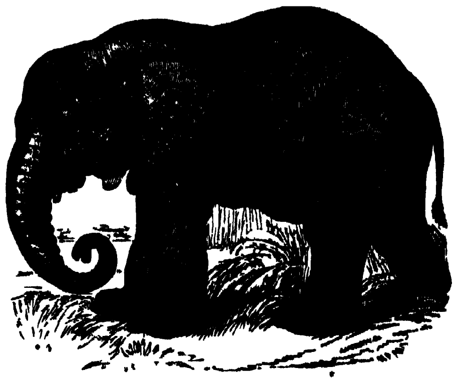


339 —Young Elephant suckling,

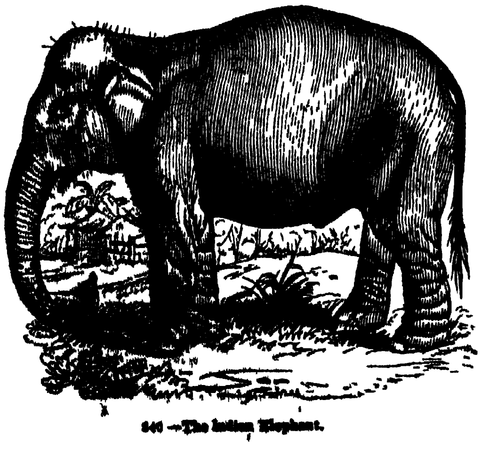


346 —End of trunk of Male

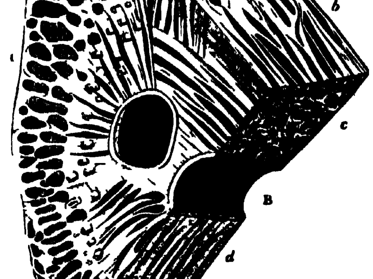
347 —End of trunk of Female



336.—African Elephant.



340 —The Indian Elephant.



344 —Section of the trunk of the Elephant.

338.—Elephant kneeling.

the old one, and which gradually becoming developed advances forwards as the old one wears away, till its last remnant is pushed out. The position of the new tooth, with respect to the old one, in progress of wearing will be seen by referring to the section of the skull, Fig. 329; the characters of the young teeth when forming and before worn down are delineated in Fig 331, *c*, *d* In the skull (Fig 329) H shows the anterior tooth reduced almost to nothing by detrition, and by the compression of the succeeding tooth, I shows a full-formed tooth in activity, already partially ground down on its face K, but with the posterior lamina as yet untouched; L, is the germ of a tooth, to succeed the former (I)—it is enclosed in a membranous capsule, and lodged in a cavity at the back of the jaw On this subject we might enlarge, but our limits forbid. The tusks of the elephant (upper incisors) are destitute of true roots, and have no other union to their deep sockets than that of close contact, they resemble a nail driven into a plank, and by gentle and continued pressure may have their direction altered. They consist of concentric layers of ivory, and grow by the continued deposition of these layers added internally, for the pulp or core which deposits the ivory fills the cavity at the base of the tusk, and arises from the bottom of the socket, it is of great size, and has no organic union with the tusk it secretes. We have seen several instances in which bullets have, on cutting the tusks, been found imbedded in the ivory, to the astonishment of those who know not the manner in which the tusks are produced. In these instances the bullet has entered the socket, and lodged in the bottom of the hollow base of the tusk, and the pulp or core in that hollow has kept covering it with layer after layer of ivory, the tusk growing all the time, till at last, from being in the hollow, the bullet attains the solid centre of the full grown tusk, being moved farther and farther forwards by each deposit of ivory from within The tusks are not shed, as are the molars, but a permanent pair succeed a deciduous pair, shed between the first and second year of existence These tusks vary in size and curve we learn from Mr. Corse that one variety of Asiatic elephant is characterized by straight tusks pointing downwards, it is termed Mooknah another variety has large heavy tusks inclining more or less upwards, and is termed Dauntelah Independently, however, of the shape and size of the tusks in the male, the Asiatic species is divided into two main or principal castes, between which there are many degrees of intermixture. These two castes are called respectively Koomareah and Merghee The Koomareah is a deep-bodied, strong, compact elephant, with a large trunk, and legs short in proportion to the size of the animal The Merghee when fully grown is generally taller than the former, but he has not so compact a form, nor is he so strong or so capable of bearing fatigue, his legs are long, he travels fast, has a lighter body, and his trunk is both short and slender in proportion to his height A large trunk is always esteemed a great beauty in an elephant, so that the Koomareah is preferred not only for this, but for its superior strength, by which it can undergo greater fatigue, and carry heavier loads than the Merghee

The external characters of the elephant, which we have not as yet noticed, need not long detain us The skin is dark-coloured, rough, and nearly destitute of hair; a tuft of bristles laterally disposed terminates the tail, the eyes are very small, but lively and intelligent, the tusks project on each side of the base of the proboscis On each temple are situated certain glands with ducts opening on the surface of the skin, whence exudes an unctuous secretion, but beyond this nothing appears to be ascertained The udder of the female is placed on the chest between the fore-legs, and the young elephant sucks with the side of its mouth, compressing the udder with its trunk, to increase the flow of milk (Fig. 339).

The young elephant at its birth is about thirty-five inches in height, and it arrives at maturity when between eighteen and twenty four years of age The average ratio of growth, as ascertained by Mr Corse ('Phil. Trans.' vol. xviii), is eleven inches in the first year, eight inches in the second six the third, five the fourth, five inches in the fifth, three inches and a half in the sixth, and two inches and a half in the seventh. The males are probably longer in attaining their full growth than the females, but the females produce young before they have ceased to grow. Mr. Corse mentions one instance in which the increase of growth during pregnancy amounted to five inches. The period of gestation is twenty months and eighteen days. The elephant possesses the senses of smell and hearing in great perfection, and musical sounds evidently produce pleasure.

Heavy and clumsy as is the form of this animal, yet its pace is tolerably quick, especially over level ground, indeed, when irritated, the elephant rushes on with great rapidity, and many are the instances on record in which the hunter, unsuccessful in his shot, has been pursued, overtaken, and trodden to death. The gait of the animal is, however, peculiar, and destitute of elasticity, and on reference to the skeleton (Fig. 341) the reason will be immediately perceived. In the first place the bones of the limbs have an almost perpendicular bearing with respect to each other; and in the next place there is no canon-bone (a long metacarpal and metatarsal bone) as in the fore and hind limbs of the horse, which may thus be said to have three bones in the leg, those of the hinder limbs in particular being all oblique, whereas the elephant has the metacarpal and metatarsal bones five in number in each foot, short, and restricted to the foot itself, instead of adding to the length and elasticity of the limbs. In the horse the thigh bone is very short, the true knee-joint is as high as the flanks, and the whole of the limb from the hock joint to the hoof, which really constitutes the foot, consists of tarsal or instep bones a long metatarsal or canon-bone, and three phalangal bones, the last cased in horn, these are commonly called the pastern bones and coffin bone. The arrangement of these bones in the limb of the elephant is very different, and the knee, from the length of the thigh-bone, is lower than in the horse, so that the animal kneels in the same way as man (see Fig 338).

The haunts of the elephant in his native regions are forests along the borders of rivers, well watered and fertile plains, where vegetation attains its utmost luxuriance, and green savannahs There he reposes in the shade of the trees, or cools himself in the waters Bathing, indeed, is one of the favourite enjoyments of this beast Even in our climate during the summer months the bath is a luxury we have often seen the elephant in the gardens of the Zool Soc plunge into his tank, draw the water up into his trunk, and spout it in showers around, then immerse himself completely, the end of the trunk alone appearing above the surface, and there flounder about in the exuberance of health and spirits In his native country he crosses the broadest rivers, the body, while swimming, being submerged, and nothing seen but the extremity of the upraised proboscis Nor is it to water only that the elephant displays a partiality he luxuriates in the ooze and mud of swamps and marshes, and rolls and wallows in the half fluid mire We have seen him fill his proboscis with this mixture, and discharge it over every part of his body so as to invest himself with a layer of mud. In the hot regions of which he is a native, he may find this a means of protecting the skin from the scorching of the solar rays, as well as a defence against the annoyance of insects, for the skin thick and coarse as it is, is nevertheless extremely sensitive The same partiality for the mud bath is also displayed by the rhinoceros and the hog

Bishop Heber has described the bathing of wild elephants which he saw upon his approach to Decca, "At the distance of about half a mile from these desolate palaces, a sound struck my ear, as if from the water itself on which we were riding the most solemn and singular I can conceive It was long, loud, deep, and tremulous something between the bellowing of a bull and the blowing of a whale, or perhaps most like those roaring buoys which are placed at the mouths of some English harbours, in which the winds make a noise to warn ships off them 'Oh!' said Abdallah, 'there are elephants bathing Decca much place for elephant' I looked immediately, and saw about twenty of those fine animals with their heads and trunks just appearing above the water Their bellowing it was which I had heard, and which the water conveyed to us with a finer effect than if we had been on shore' Besides the water and mud-bath for cooling the skin and keeping off flies, the elephant, as is often seen in India, will fan himself with a large bough, and use it with ease and dexterity. The beautiful description by Mr Southey of this habit is so appropriate, that we hesitate not to introduce it —

> "Trampling his path through wood and brake,
> And canes which crackling fall before his way,
> And tassel grass whose silvery feathers play,
> O'ertopping the young trees,
> On comes the elephant, to slake
> His thirst, at noon, in yon pellucid springs.
> Lo! from his trunk upturn'd, aloft he flings
> The grateful shower and now
> Plucking the broad leafed bough
> Of yonder plume, with waving motion slow,
> Fanning the languid air,
> He waves it to and fro"

A herd of elephants headed by their mighty leaders feeding in calm security in the secluded depths of the forest, or on the banks of a river in some secluded valley, forms one of the most imposing pictures in nature. Such a scene is beautifully described by Pringle; but willingly as we would quote it, our limits forbid. One point, however, we may notice—the use, as observed by that traveller, to which these animals apply their tusks as levers in uprooting trees. It was in the valley of the Koonap River that the narrator came upon the track of a herd: "Foot prints of all dimensions from eight to fifteen inches in diameter were everywhere visible, and in the swampy spots on the banks of the river it was evident that some of them had been luxuriously enjoying themselves by rolling their unwieldy bulks in the ooze and mud. But it was in the groves and jungles that they left the most striking proofs of their recent presence and peculiar habits. In many places paths had been trodden through the midst of dense thorny forests otherwise impenetrable. Among the groves of mimosa-trees, which were thinly sprinkled over the grassy meadows along the river margins, the traces of the elephants were not less apparent. Immense numbers of these trees had been torn out of the ground, and placed in an inverted position, in order to enable the animals to browse at their ease on the soft and juicy roots, which form a favourite part of their food. I observed that, in numerous instances, when the trees were of considerable size, the elephant had employed one of his tusks exactly as we should use a crow-bar—thrusting it under the roots to loosen their hold of the earth, before he could tear them up with his proboscis"

This account refers to the African species, but will also apply to the Indian. The noble elephant in the garden of the Zool Soc. has at different times used his tusks in wrenching down the boards which line his apartment, and that with such effect as to demolish no small portion of the inner woodwork, which is of great strength and thickness.

The African elephant equals, if it does not surpass, its Indian relative in size Major Denham saw one killed which measured 12 feet 6 inches in height, and mentions others which appeared to be considerably larger Mr. Pringle saw one which two officers of engineers agreed in stating at 14 feet. The Indian elephant seldom exceeds 10 feet.

From the earliest times this noble beast has been employed by man, and multitudes have been drafted from their native forests, and with little training brought to implicit obedience. It has served him as a beast of burden, or as an auxiliary of war, and has added by its presence to swell the pomp of kings and conquerors Setting aside the rude method of taking these animals in pits, now seldom or never practised, it is remarkable that in every mode man avails himself of the assistance of individuals of the same species which he has already subdued

It is well known that large male elephants, from some cause not ascertained, occasionally wander about alone, they are of large size and great ferocity, and wherever they pass do much mischief. Being the finest elephants, and best adapted for sale, great as the risk may be, the hunters eagerly endeavour to capture them They follow them cautiously, by day and night, with two or four trained females, called koomkies If it be dark they can hear the animal striking his food, to clean it, against his fore legs, and then they approach tolerably close if it be light they advance more cautiously The females gradually move towards him apparently unconscious of his presence, gathering herbage and feeding on it with great complacency, as if they were, like him, inhabitants of the wild forest It is soon seen by them whether he is likely to be entrapped by their arts, the drivers remain concealed at a little distance, while the koomkies press round the unfortunate goondah, or saun (for so these solitary males are called) If he abandon himself to the caresses of his new companions, his capture is almost certain The hunters cautiously creep under him, and during the time that his attention is thus absorbed they fasten his fore-legs with a strong rope It is said that the wily females will not only divert his attention from their mohouts, but absolutely assist them in fastening the cords (see Fig 352) The hind legs are also secured, and, if the situation permits, lashed to a large tree. The hunters then leave him, and the faithless females retire. he tries to follow, and discovers his condition. If fastened to a tree (Fig 353), he exhausts himself with rage and vain efforts to break loose, but if not secured, still he moves with difficulty in his shackles, and as long cables are left trailing behind him, the mohouts soon seize the opportunity of lashing them round a tree of sufficient strength. Sometimes he breaks his bonds and rushes madly to the forest, where the hunters dare not follow him But if adequately bound, his struggles are useless, and, worn out by the violence of his anger, his exertions, and hunger, he submits at length, and is conducted under the escort of his treacherous friends to an appointed station, and, after a few months' discipline, becomes reconciled to his fate.

In the 'Asiatic Trans.,' vol. iii., Mr. Corse gives an animated description of the mode of conducting the operation of elephant-catching on a great scale, as practised at Tipperah, where thousands of people assemble to drive a herd of these superb animals with the clang of drums and trumpets, and the din of fireworks and musketry. The outline of the plan is as follows:—The herd when discovered is surrounded by a circle of men, divided into small parties, at the distance of 20 or 30 yards from each other; these, by noises of various kinds, and by fires lighted at different posts, drive the animals into a body; in the morning the circle opens, and the herd is slowly driven forward towards a spot where a new circle is prepared to receive it; the people closing up, taking their proper stations, and passing the remainder of the day and night as before. In this manner, day after day, it is conducted towards a sort of concealed pound or inclosure called a keddah, made of strong timbers, and divided into two or three great pens communicating with each other by means of gates, which are shut as the herd is forced from pen to pen. The last pen has a narrow outlet passage with a doorway sufficient for the entrance of only one elephant at a time, and the passage itself will not allow a large elephant to turn round. When by dint of noise and fires the animals have entered the first gate of the keddah, and they find themselves ensnared, their rage is extreme, but escape is now impossible, one outlet only offers, but it leads to the next inclosure. the leader enters, the rest follow; the gate is instantly shut by people who are stationed on a small scaffold immediately above it, and strongly barricaded; fires are lighted, and the same discordant din made and continued, till the herd has passed through another gateway into the last inclosure, the gate of which is secured in the same manner as the former was. The elephants, being now completely surrounded on all sides, and perceiving no outlet through which they can escape, appear desperate, and in their fury advance frequently to the ditch, in order to break down the palisades, inflating their trunks, screaming louder and shriller than any trumpet, sometimes grumbling like the hollow murmur of distant thunder; but wherever they make an attack, they are opposed by lighted fires, and by the noise and triumphant shouts of the hunters. As they must remain some time in this inclosure, care is always taken to have part of the ditch filled with water, which is supplied by a small stream, either natural, or conducted through an artificial channel from some neighbouring reservoir The elephants have recourse to this water to quench their thirst after their fatigues, by sucking the water into their trunks, and then squirting it over every part of their bodies While they remain in this inclosure they continue sulky, and seem to meditate their escape; but the hunters build huts around them close to the palisades, watchmen are placed, and every precaution used to prevent their breaking through.

When the herd has continued a few days in this partition, the door of the outlet passage is opened, and one is at last enticed in with food Having entered, the door is closed and securely barred: retreat is impossible, and the captive is hemmed completely in. His struggles in that narrow cage are useless. He is then enveloped in a labyrinth of cords, and exhausted with fatigue and fury, he is led out between two powerful trained beasts, to whom he is bound and tied, and brought by them to a spot where he is fastened to strong trees (see Fig. 354). He then becomes again excited, and sometimes falls a victim to his paroxysm of fury; but commonly the cravings of hunger induce him to eat, and he gradually yields to the power of gentle discipline.

It is not an unfrequent occurrence for a domesticated elephant to escape to the wild herd, and resume its former independence; and such have been retaken, and submitted immediately to their former riders. Mr. Corse mentions a female which twice escaped, and who each time she was taken obeyed the words of command, attended to her name, came to the side of the keddah when called, ate from the hands of the hunters, and knelt down when ordered. In another case, that of a male, which had escaped about eighteen months, the animal was furious when entrapped in the keddah: an old hunter, however, recognised him, rode boldly up to him, and ordered him to lie down, pulling him by the ear. The animal seemed quite taken by surprise, and instantly obeyed. Warren Hastings, the governor-general of India, possessed an elephant which had been ten years absent from the rule of man. His keeper being dismissed, he was refractory to all others who attempted to control him; and at length escaped to the wild herd. After the long interval we have mentioned, his old keeper recognised him in a keddah, and he instantly submitted himself to him. Mr. Zoffany painted the portrait of this animal, and, in the key to his published print of a tiger-hunt, vouches for the authenticity of this account. Fig. 359 is a copy of Mr. Zoffany's print.

The elephant is not used in the present day in India as an engine of war, but as a beast of burden, in the transport of baggage, tents, and various stores · and there are peculiar circumstances in the march of an Indian army which render the elephant extremely serviceable. Where dense jungles offer impediments which the pioneers could not obviate without great labour and consequent delay, three or four elephants clear the way at once; trampling down the long grass and bushes, and breaking down the slender trees; in short, levelling all before them · again, where the artillery has to be dragged through heavy roads of clay and mire, and deep sloughs, their strength and sagacity are in great requisition. They always apply their force in the most efficacious manner, and assist each other with wonderful sagacity. Capt Williamson thus notices their services in this particular —"Many of our most arduous military operations have been greatly indebted for their success to the sagacity, patience, and exertion of elephants Exclusive of their utility in carrying baggage and stores, considerable aid is frequently supplied by the judgment they display, bordering very closely on reason. When cannon require to be extricated from sloughs, the elephant, placing his forehead to the muzzle, which when limbered is the rear of the piece, with an energy scarcely to be conceived, will urge it through a bog from which hundreds of oxen or horses could not drag it · at other times, lapping his trunk round the cannon, he will lift while the cattle and men pull forward. (Fig 356.) The native princes attach an elephant to each cannon, to aid its progress in emergencies. For this purpose the animal is furnished with a thick leather pad covering the forehead, to prevent its being injured It has sometimes happened that, in narrow roads or causeways, or on banks, the soil has given way under heavy cannon; when an elephant, being applied to the falling side, has not only prevented the piece from upsetting, but even aided it forward to a state of security." Elephants have probably been employed in this manner from the first introduction of artillery into Asia Bernier, describing the army of Aurungzebe, says—"Many of these cannon are so ponderous, that twenty yoke of oxen is necessary to draw them along; and some, when the road is steep or rugged, require the aid of elephants in addition to the oxen, to push the carriage wheels with their heads and trunks" Heavy guns are often carried on elephants' backs, both in the native and the Indian armies.

In dragging cannon [illegible]asses, where the road is steep and [illegible] have often performed good [illegible] the praises and encouragem[illegible]h have great effect upon [illegible] have achieved any difficult [illegible] reward them with sweetmeats an[illegible] all accounts they labour expecting t[illegible] reward. In former times, the elephant, adorned with gorgeous trappings, swelled the royal state of princes and persons of distinction, but in British India it is now rarely seen upon occasions of ceremony, excepting at the courts of the native princes who still retain some degree of independent authority. In Calcutta their use is prohibited, as horses unused to them often take fright and occasion accidents. A line of elephants richly caparisoned is however a noble spectacle. At Vizier Ali's wedding in 1796, there was a grand procession of twelve hundred elephants all magnificently adorned, of these one hundred in the centre had howdahs, or castles, covered with silver, and in the midst appeared the nabob, mounted on an uncommonly large elephant, within a howdah covered with gold, richly set with precious stones. Some of the elephants of Aurungzebe were, according to Bernier, most splendidly attired Sir T. Rowe thus describes the state elephants of Jehanghir —"His greatest elephants were brought before him, some of which, being lord elephants, had their chains, bells, and furniture of gold and silver, attended with gilt banners and flags, and eight or ten elephants waiting on him, clothed in gold, silk, and silver Thus passed about twelve companies, most richly furnished, the first elephant having all the plates on his head and breast set with rubies and emeralds, being a beast of wonderful stature and beauty They all bowed down before the king"

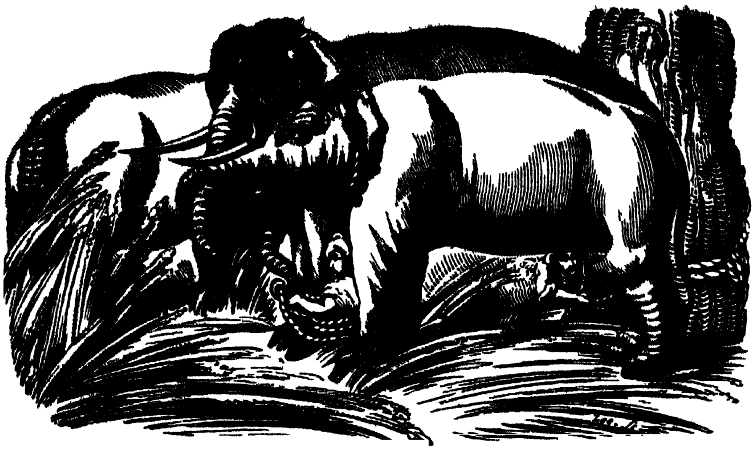
By Europeans in India, the elephant is used for travelling, and in hunting the tiger. The horse cannot be brought to follow the track, or stand firm at the sight of the ferocious beast, but the elephant will do both, and besides his delicate scent, his bodily powers, which enable him to make his way through the thickest covers, and his great stature, which places the hunters seated in a howdah on his back in comparative safety, are peculiar recommendations. (See Figs 360, 361, 362,) After all, however, the sport is not unattended with danger, for the elephant fears the tiger, and the latter, when wounded or hard pressed, bounds upon the nearest elephant, and mostly tries to seize the creature's trunk: this it throws up as high as possible, and if a staunch beast, endeavours to receive the foe on its tusks: well-trained elephants have been known to succeed, and, instantly kneeling, transfix the tiger and pin him to the ground (Fig. 357); but it often happens that the tiger accomplishes his effort, in which case the elephant loses all self-possession, and sets off at full speed, roaring violently, and throwing all into confusion. Sometimes indeed the elephant will not stand the attack, but precipitately retreats in the greatest consternation, in which case, if the tiger springs upon the animal, the hunters are in imminent peril. Mr. Williamson ('Oriental Field-sports') relates an instance in which a gentleman went out with others in pursuit of a cunning and daring tiger, and who urged his mohout to make his elephant beat among the tall grass where the scent was strongest; this being done, in spite of the tremendous tones of the agitated animal, the tiger found himself compelled either to resist or submit to be trodden upon: he sprang at once upon the elephant's quarter, fixed his fore-paws in the pad on the animal's back, and his hind-claws in the flesh of the thigh In a paroxysm of fear, occasioned by the suddenness of the attack, and pain, the elephant dashed through the cover, the tiger still clinging, but unable, from the motion of the elephant, to mount higher. It was with difficulty that the gentleman could keep his seat, and he was prevented from firing at the grim beast, both from his unprecedented situation, and from the danger of wounding some of the numerous followers who were exerting the utmost speed of their respective elephants to come to his assistance The pace of the elephant was wavy and irregular, owing to the animal's fear, and fortunately gave opportunity for some of those mounted on light and speedy animals to overtake it, when a gentleman of the party despatched it with a shot.

It is said that the elephant displays great fear towards the rhinoceros · Major Lally stated to the author of the 'Oriental Field sports,' that he once witnessed, from a distant hill, a most desperate engagement between a large male elephant and a rhinoceros, in which the elephant was worsted and fled (Fig 363) Baber, however, in his memoirs observes, that on the occasion of a rhinoceros hunt, one of the elephants fell right in with the rhinoceros, upon which the latter immediately ran off in another direction. That an enraged male of each species may meet, and fight, is not perhaps improbable, but we have no good grounds for supposing any animosity to exist between the two species; certain it is that the male elephant and rhinoceros [illegible] adjoining compartments manifest towards each other neither fear nor dislike

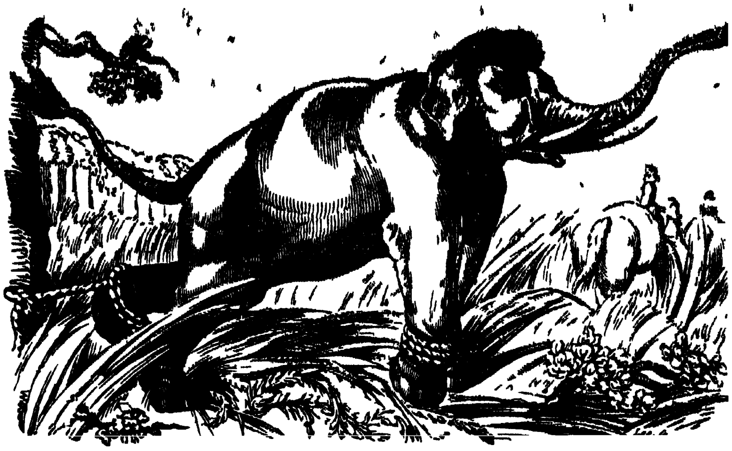
White elephants, that is, albinos, are occasionally [illegible]und, and are highly valued. At the court of Ava royalty is incomplete without such an appendage, and both the nobles and people would consider it inauspicious to want a white elephant. In Siam also, as well as in the Birman empire, the white elephant is venerated Mr Crawford ('Embassy to the court of Ava'), who saw the celebrated white Birman elephant (Fig 355), as well as six belonging to the king of Siam, states respecting the former that his establishment is very large. White elephants were not unknown to the ancients, and were occasionally exhibited to the admiration of the populace— "Sive elephas albus vulgi converteret ora" (Horace.)

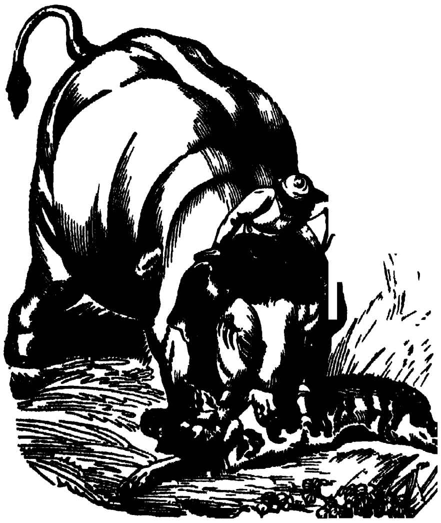
Let us now turn from the Indian to the African species This animal is found from Senegal and Abyssinia to the confines of the Cape settlement, wherever rivers, lakes, and extensive forests render the region suitable for its residence. In the plains of the kingdom of Congo, where the herbage attains a wild luxuriance, amidst innumerable lakes, and on the borders of the Senegal, whose waters flow through extensive forests, herds of elephants still wander, and also in the remoter districts of Caffraria. Cuvier appears to have had some suspicion that the elephant of Abyssinia and the eastern portions of Africa might possibly be identical with the Indian species, and he adduces the testimony of Ludolphe, who, in his 'History of Abyssinia,' states that the female elephants of that country are destitute of tusks: he acknowledges indeed that the authority of Ludolphe is doubtful, nevertheless, he adds, his testimony is confirmed by Bruce, at least in one particular case, for, in the account of an elephant-hunt at which he assisted, the tusks of a female were small, whilst the male had them of great magnitude. We cannot lay much stress on a single case of this kind, and it is to be observed that no mention is made of the size of the ears or shape of the head, nor can we say whether or not the individual was young or adult. It is not improbable that breeds or races may differ in Africa as they do in India.

In ancient times the elephant appears to have ranged along the north and north-western shores. "Elephantos fert Africa ultra Syrticas solitudines, et in Mauritania," says Pliny, and Ælian asserts that they dwell in the forests and pasture-lands at the foot of Mount Atlas. Though none are found in those localities in the present day, we give full credit to the assertion, for we know that the lion once



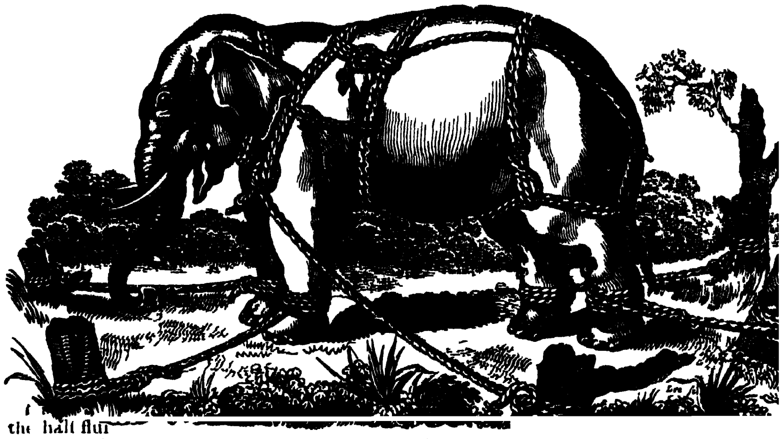
352.—Wild Elephant captured by means of dec



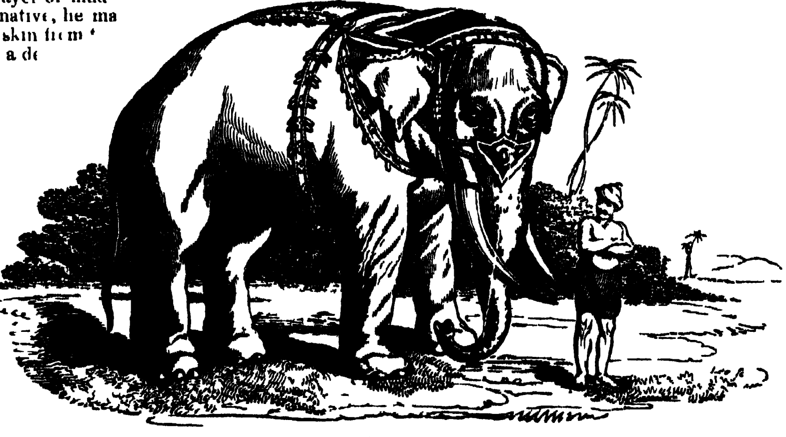


357.—Elephant pinning a Tiger

the half flu
his proboscis with
it over every part of
elf with a layer of mud
ich he is a native, he ma
tecting the skin from
as well as a de
for the

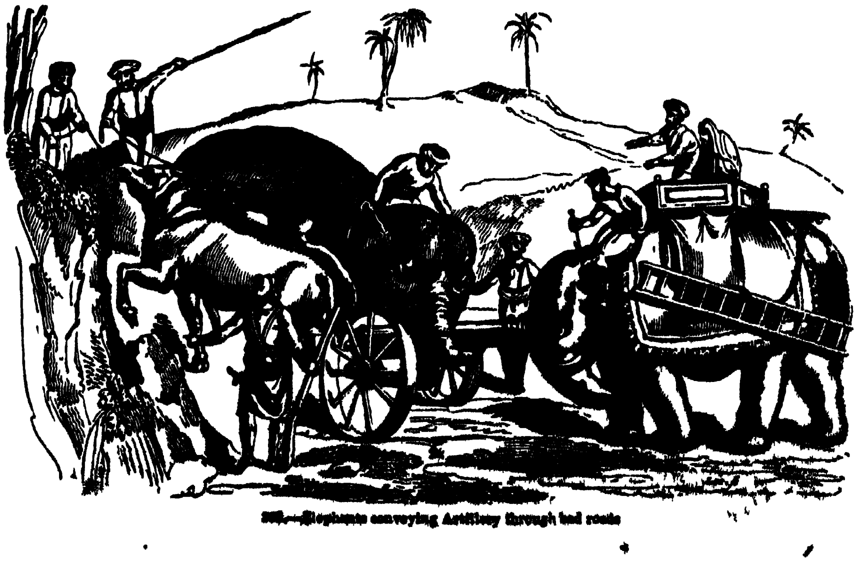


354.—Elephant harnessed in a keddah



355.—White Elephant of Ava

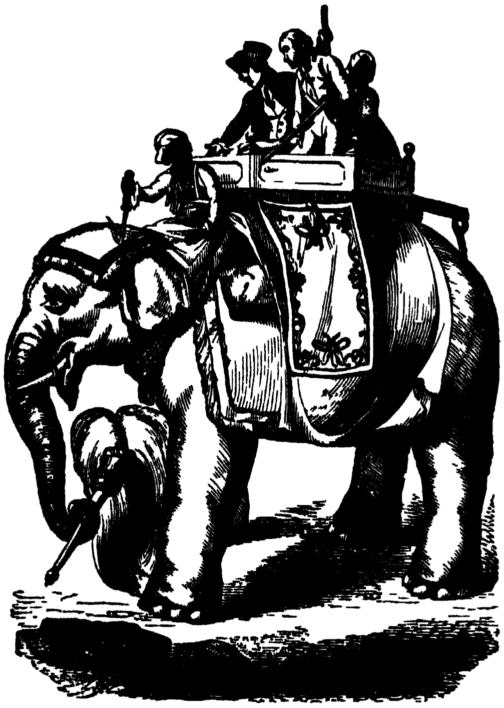
358.—Scene exhibited at the Adelphi Theatre.



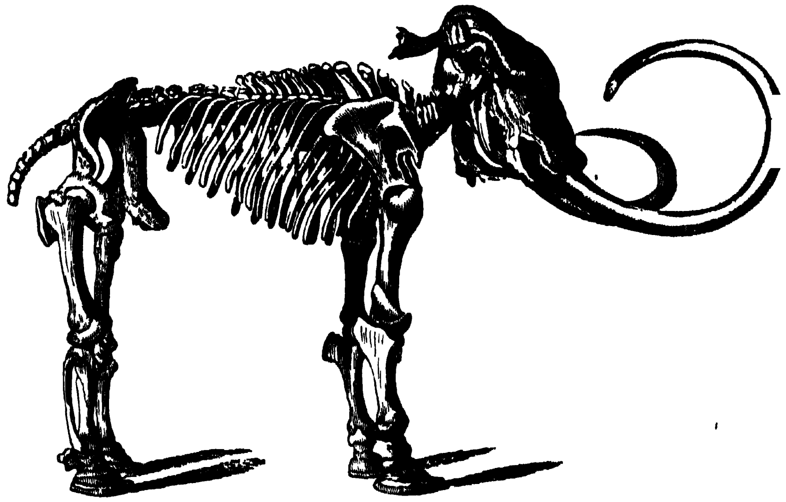
[illegible].—Elephants conveying Artillery through bad roads

360.—Tiger springing.

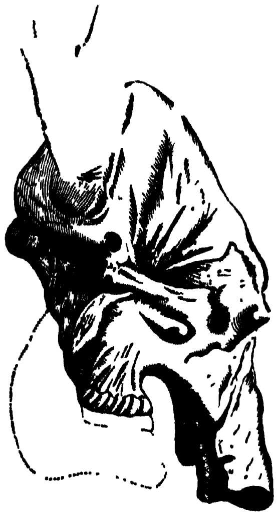
362.—Elephant attacked by a Rhinoceros.



359.—Warren Hastings' Elephant.

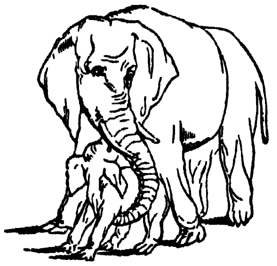


365.—Mammoth found in Siberia.



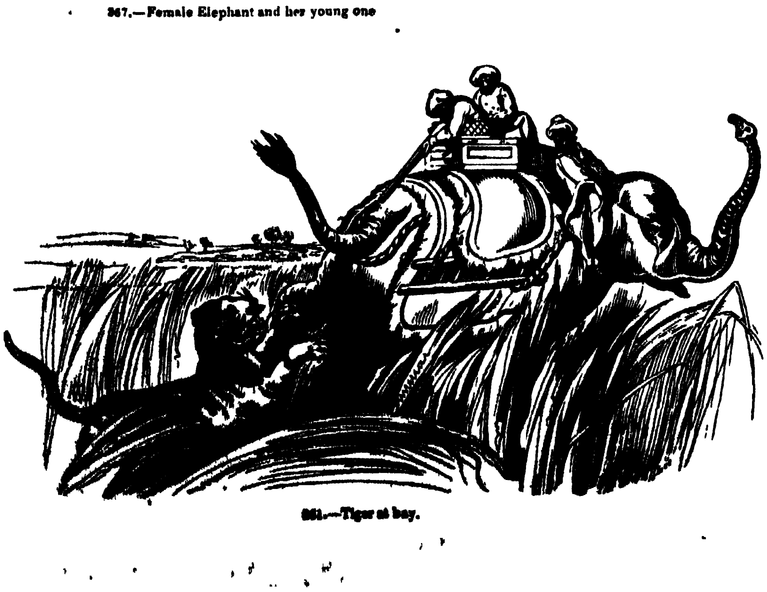
366.—Skull of Mammoth.

364.—Elephant swimming.



367.—Female Elephant and her young one.

363.—Hunters in a howdah.



361.—Tiger at bay.

abounded in regions where it has long disappeared. Moreover the Carthaginians, who used the African elephant as an engine of war, as Porus and the Indian kings did the Asiatic, collected, on the threatened invasion of Scipio (B.C. 205), a great number of these animals, so quickly as to prove that they had not to penetrate far into the interior to procure them. The Ptolemies, it would seem, procured their elephants in Abyssinia. Herodotus states that this animal abounded, with bears and lions, in Libya. Ethiopia paid a tribute to Darius, which consisted in part of elephants' tusks. Though the Romans were at an early epoch acquainted with ivory, the Etruscan attributes of royalty being sceptres and thrones of this material, still the first personal acquaintance of the Romans with this animal was when Pyrrhus, king of Epirus (B.C. 281), invaded Italy, bringing elephants as part of the military force. These, however, were most probably Indian; and might indeed have been some of the numbers which were left by Alexander at his death, about half a century previously, and which with his kingdom and treasures were divided between his successors, and employed in the sanguinary wars which arose out of their individual contests for empire. At all events, as India was open, these animals might easily have been procured. Perdiccas led them into Egypt against Ptolemy, and they were governed by Indian mohouts; Ptolemy opposed them by Ethiopian elephants, which were not considered so effective as the Indian animals, perhaps from not being so well trained. The Romans called the elephant the Lucanian ox, as it would seem from having first encountered it in the territory of Lucania; and this name was generally adopted afterwards. In the Punic war the Romans had to encounter the African elephant, and Regulas captured eighteen at the battle of Adis. Afterwards at the battle of Panormis (Palermo) upwards of 100 were taken, and the consul Metullus transported them to Rome to gratify the wonder of the people, and die in the circus for their amusement. Hannibal employed them in Spain, and, as is well known, in Italy, and when those which he brought with him had all perished, he received large reinforcements from Carthage.

After the close of the Punic war, the Romans themselves used the African elephant in subduing Macedonia; and thirty years afterwards, Perseus, the last king of Macedon, whose great predecessor had made Europe familiar with the power of the elephant, possessed none in his own army to oppose those brought against him by Quintus Martius Philippus, and, after four years' ineffectual resistance, Macedonia became a Roman province. At the battle of Magnesia, Scipio brought African elephants against Antiochus, who opposed them with elephants from India, and thus in hostile array were brought together the peaceful tenants of the plains and forests of two remote regions of the earth separated by seas and deserts. Julius Cæsar employed on various occasions the elephant in his armies, but more perhaps as a beast of burden, and for the sake of ostentation, or of striking terror among barbarous people, than for actual combat. The Romans became now well acquainted with this beast, and availed themselves of it for the purpose of drawing splendid chariots in triumphal processions, but seldom used it as an arm of war. They, however, forced it into the brutal, demoralizing combats of the amphitheatre, or amused themselves with its unwieldy performances in theatrical pageants—such as we have seen in our own days. (Fig. 358.) For more than 500 years did Africa contribute elephants to the Roman circus, and incalculable numbers perished during that long period; thousands were dragged from the forests of Ethiopia to gratify by their torments an ignorant and debased multitude, and thousands were slaughtered in their native regions for the sake of their ivory, of which both African and Indian were in the greatest request. Of this material were fashioned the most imposing statues; the rooms and furniture of the patricians were inlayed with gold and ivory; and it ornamented halls, porticoes, and temples.

With respect to the African elephant it was most probably bred by the Romans in a state of domestication. Fig. 367 is a copy of a representation on the walls of Pompeii of a female African elephant suckling her young one. The picture exhibits a perfect acquaintance with the mode in which the little elephant receives sustenance from its mother, a fact of which Buffon and the naturalists of the last century were ignorant.

At length the power of Rome declined, the butchery of the circus was suspended, and in the time of Justinian (A.D. 527) an elephant was esteemed a rare spectacle at Rome and Constantinople. The intercourse between Europe and Africa, on the fall of the Roman empire, became in a great measure suspended for centuries; a wandering population of Arabs spread over the northern regions of Africa; and the elephant, no longer hunted for his ivory or captured for the circus, wandered unmolested in his native forests: the modes employed by the Carthaginians for training the animal were forgotten; nay, that it had ever been reclaimed to the service of a people whose place had been since occupied by Roman, Vandal, and Arab conquerors, was a circumstance buried in oblivion, and the African elephant was at last believed to be incapable of the discipline which still subjects the Indian to the use of man. In recent times the demand for ivory has again revived, and in south and western Africa the herds of elephants are thinned by the gun of the hunter.

Hitherto we have confined our observations to the two species of elephant at present existing on our globe; time was, however, when a species differing from either abounded on the earth, and ranged over a great extent of country, tenanting climates not only within the temperate latitudes, but such as are now exposed to the severities of an Arctic winter, where their tusks are found in great abundance, and collected for the sake of the ivory, which is still available.* More than this, however, the animal, flesh and all, has been found in a state of preservation entombed in ice. Ages had rolled by since the day which saw it inurned in its strange sarcophagus; nations and tongues and empires had risen and passed away; the very region it inhabited had undergone an alteration of temperature and productions—yet, while the proudest monuments of human industry were perishing, while nations were falling or rising, had this body remained, as when the life departed, to be displayed in later days as a relic of times beyond the date of human records. We allude to the mammoth found at the mouth of the Lena in Siberia.

In 1799 a Tungusian, who went along the coast to seek for mammoths' tusks, first perceived the carcass on a vast block of ice, but without being able to make out its true character. In 1801 it became partially exposed; in 1803 it became disengaged by the melting of the ice; and in 1804 the Tungusian, named Schumachoff, cut off the tusks and sold them to a merchant for the value of fifty rubles. Two years afterwards Mr. Adams found the mammoth still on the shore, but greatly mutilated. The Yakutski had fed their dogs with the flesh. Bears, wolves, wolverenes, and foxes had feasted upon it; but though all the flesh and the proboscis were gone, the skeleton remained with the exception of one fore-leg. The skin was also to a certain extent perfect, and one of the ears was well preserved with its tuft of hairs. The skin, of a dark tint, was covered with reddish wool and black hairs; but much of the fur was injured by damp, and much trodden into the earth by the bears. The skeleton and other portions of value were carefully collected; the tusks were repurchased, and the whole transported to St. Petersburg.

The skeleton is now in the museum of the Academy, and the skin still remains attached to the head and feet. A part of the skin and some of the hair of this animal were sent by Mr. Adams to Sir Joseph Banks, who presented them to the Museum of the Royal College of Surgeons. The hair is entirely separated from the skin, excepting in one very small part where it still remains attached. It consists of two sorts, common hair and bristles, and of each there are several varieties, differing in length and thickness. That remaining fixed on the skin is of the colour of the camel, an inch and a half long, very thick-set, and curled in locks. It is interspersed with a few bristles, about three inches long, of a dark reddish colour. Among the separate parcels of hair are some rather redder than the short hair just mentioned, about four inches long; and some bristles nearly black, much thicker than horsehair, and from 12 to 18 inches long. The skin when first brought to the museum was offensive; it is now quite dry and hard, and where most compact half an inch thick. Its colour is dull black. Fig. 365 represents this fossil elephant or mammoth (*Elephas primigenius*). Another and prior instance of the discovery of an ice-preserved elephant is recorded: in this case the carcass was found on the borders of the Alaseia river, which flows into the Icy Ocean beyond the Indigirska; it had been set free by the stream, and was in an upright position, almost perfect, and covered with the skin, to which there still adhered in many places hairs and fur, as in the Lena specimen. There are not wanting other instances of parts, as the head and feet, with the flesh on, having been found in ice: nor is it only of the elephant that preserved remains exist; for in 1771 the body of a rhinoceros, perfect, or nearly so, preserved in frozen earth or gravel, was disinterred near the Vilhoui. The head and feet are at St. Petersburg.

Asiatic Russia and Siberia appear to have been the stronghold of the mammoth; over these vast regions indeed its fossil remains occur in incredible numbers. There is in fact no river from the Don to Kamtschatka where, either along the banks or on the beds, these relics, with those of other extinct species, do not abound. It is not, however, only in that extensive tract that the fossil relics of elephants occur. They are common in Italy, France, Germany, Bohemia, and the British Isles. They are found also in North America, mixed with those of the mastodon; and have been brought by Baron Humboldt from Mexico and Peru.

Fig. 366 represents the skull of the Elephas primigenius. In form it approximates the most nearly to that of the Indian elephant, but has several distinguishing characteristics. The grinders for instance have the ribands of enamel across the worn crown thinner and less festooned at their edge, and in a given space are more numerous, being closer together. The facial line is more perpendicular, and the top of the skull more peaked. The alveoli of the tusks are far more extensively developed, a circumstance which must have given a peculiar character to the physiognomy of the animal, very unlike that of the living species. The lower jaw is shorter, and more upright at its symphysis; while the grinder, instead of sweeping upwards as it proceeds, follows a nearly level line. The tusks are generally very large, arched and directed upwards and outwards with a bold and somewhat spiral turn.

With respect to the strata in which these fossil relics are found, it may be stated that it is only in alluvial and superficial deposits—those filling the bottoms of valleys, or forming the borders of rivers, the mud of certain caverns—the crag formation and other tertiary fresh-water deposits, that they as a rule occur. In these slightly consolidated strata are also found other fossil relics, some of quadrupeds of existing genera, and some of which there are no living prototypes.

In some regions where the remains of the mammoth and rhinoceros abound, as northern Siberia, a decided change in the climate must have taken place since the era of the existence of the animals; although, as the clothing with which they were invested proves, the climate was moderate, and often cold; not however as it is now—for, as Mr. Lyell observes, "it would be difficult, if not impossible, for such animals to obtain subsistence during an Arctic winter." Yet on the other hand, "So many skeletons could not have belonged to herds which lived at one time in the district, even if those northern countries had once been clothed with vegetation as luxuriant as that of an Indian jungle. But if we suppose the change to have been extremely slow, and to have consisted not so much in a diminution of the mean annual temperature, as in an alteration from what has been termed an 'insular' to an 'excessive' climate—from one in which the temperature of winter and summer were nearly equalised, to one wherein the seasons were violently contrasted—we may, perhaps, explain the phenomenon. Siberia and other Arctic regions, after having possessed for ages a more uniform temperature, may, after certain changes in the form of the Arctic land, have become occasionally exposed to extremely severe winters. When these first occurred at distant intervals, the drift snow would fill the valleys, and herds of herbivorous quadrupeds would be surprised and buried in a frozen mass, as often happens to cattle and human beings overwhelmed in the Alpine valleys of Switzerland by avalanches. When valleys have become filled with ice, as those of Spitzbergen, the contraction of the mass causes innumerable deep rents, such as are seen in the Mer-de-glace on Mont Blanc. These deep crevices usually become filled with loose snow, but sometimes a thin covering is drifted across the mouth of the chasm, capable of sustaining a certain weight. Such treacherous bridges are liable to give way when heavy animals are crossing, which are then precipitated at once into the body of a glacier, which slowly descends to the sea, and becomes a floating iceberg. As bears, foxes, and deer now abound in Spitzbergen, we may confidently assume that the embedding of animal remains in the glaciers of that island must be an event of almost annual occurrence. The conversion of drift snow into permanent glaciers and icebergs, when it happens to become covered over with alluvial matter, transported by torrents and floods, is by no means a rare phenomenon in the Arctic region. During a series of milder seasons intervening between the severe winters, the mammoths may have recovered their numbers, and the rhinoceroses may have multiplied again, so that the repetition of such catastrophes may have been indefinite. The increasing cold, and greater frequency of inclement winters, would at last thin their numbers, and their final extirpation would be consummated by the rapid augmentation of other herbivorous quadrupeds more fitted for the new climate."*

---

* Siberian fossil-ivory forms the principal material on which the Russian ivory-turner works

* Lyell's Geol., vol. [illegible] pp. 96-99

368.—The Mastodon.

Coexistent perhaps with the mammoth, a race of huge animals, now utterly extinct, once tenanted our globe: their remains, which are met with in the superficial strata, occur in some localities in great abundance; and, from the differences presented by the teeth and other parts, several species have been identified. To these animals Cuvier gave the title of Mastodon, in allusion to the principal character of the molars, which, instead of being formed, as in the elephant, of transverse laminæ, have the crown of simple structure, but exhibiting ranges of bold conical elevations, divided from each other by deep furrows (see Fig. 369). As the points of these elevations become worn down by use, the crown presents a series of lozenge-shaped lines of thick enamel (Fig. 370), but when these are quite obliterated, the surface becomes uniform and concave.

Of the molars thus characterised there were two above and below on each side, but before these molars it would appear that in young individuals others had been situated, and had fallen in succession, as Cuvier satisfactorily ascertained from the examination of various specimens With regard to the mode of succession in the grinders of the mastodon, it takes place, says Cuvier, by a movement from behind forwards. When the back tooth is in the act of piercing the gum, that anterior to it is worn and ready to fall, and they thus replace themselves one after the other. It does not appear that it is possible for more than two at a time on each side to be in full operation, and ultimately, as in the elephant, there is only one. That the mastodon had tusks like the elephant is proved by the large alveoli for their reception As no perfect skull of the mastodon is known, it is impossible to define its contour · it must, however, have had a general resemblance to that of the elephant, inasmuch as the tables of the frontal bone are separated in a similar manner by extensive cells

The neck is short, and the skeleton generally (Fig. 368) approximates to that of the elephant The mastodon must have possessed a proboscis, as is evident from a consideration of the structure of the skull and skeleton,—and indeed it would appear that this proboscis has not in every instance been completely decomposed The relics of the Mastodon giganteus, or "animal of the Ohio," are found in North America, especially in saline morasses, and to this circumstance Buffon thinks is to be attributed the occurrence of soft parts still capable of being made out In 1762 (as he states) out of five skeletons which were seen by the natives one skull still possessed what they called a "long nose" with the mouth under it Kalm, speaking of a huge skeleton which, in accordance with the ideas of his time, he believed to be that of an elephant, and which was discovered by the savages in the country of the Illinois, says that "the form of the trunk (bec) was still apparent, though half decomposed" Of the several species of this extinct genus the Great Mastodon, or animal of the Ohio, is the most remarkable. Its relics appear to be confined to the American continent they are distributed very generally, and are accumulated in some places in considerable abundance, but nowhere so much so as in that saline morass popularly termed the Big-bone Lick. They are found buried in the mud, and along the borders of the morass, at the depth of four feet and upwards, together with the bones of buffaloes, stags, &c These relics have no appearance of having been rolled, and, in some places, as for example along the Great Osage River, they are found in a vertical position, as if the animals had sunk down into the mud, which had closed over them. The ferruginous matter with which the bones are impregnated, says Cuvier, is the main proof of their long repose in the earth

The traditions which were rife among the Red Men concerning this gigantic animal and its destruction must not be passed over in silence. M. Fabri, a French officer, informed Buffon that the savages regarded these bones scattered in various parts of Canada and Louisiana as belonging to an animal which they named the Père aux Bœufs The Shawnee Indians believed that with these enormous animals there existed men of proportionate development, and that the Great Being destroyed both with thunderbolts. Those of Virginia state that as a troop of these terrible quadrupeds were destroying the deer, the bisons, and the other animals created for the use of the Indians, the Great Man slew them all with his thunder, except the Big Bull, who, nothing daunted, presented his enormous forehead to the bolts, and shook them off as they fell, till, being at last wounded in the side, he fled towards the great lakes, where he is to this day.

Besides the Mastodon giganteus, the following species are distinguished: M. Angustidens (Europe, America?), M. andium (Andes), M. Humboldtii (Concepcion—Chili), M. minutus, M. tapiroides, M. Turicensis, M. Avernensis (Epplesheim, Puy-de Dôme), M. elephantoides (Irawaddi, Sewalik Mountains), M. latidens (Irawaddi, Sewalik Mountains), and M. longirostis, Kaup. Professor Owen has referred the teeth from the Norfolk crag to the last-named species.

371, 372, 373.—The Hippopotamus.

M. Desmoulins, from an examination of the skulls and skeletons of Hippopotami from Senegal and from South Africa, considers that there are two distinct species, which he names respectively H. Senegalensis and H. Capensis. Very probably M. Desmoulins is correct, but as the habits of both species are precisely the same, and as the distinctive characters are founded on osteological minutiæ only, we shall not treat them as different, more especially as the point is rather assumed than absolutely proved.

The hippopotamus is a native exclusively of Africa, where, though much more limited than formerly in the range of its habitat, it tenants the banks and beds of the larger rivers, and of the inland lakes from the Gariep to the upper Nile and its tributary branches It is, however, not restricted to these, for it is marine as well as fluviatile, and Dr Smith thinks it difficult to decide whether it gives preference to the river or the sea for its abode during the day When the opportunity of choosing the sea or the river existed, he found that some selected the one, and some the other

Scarcely, if at all, inferior to the elephant in bulk, but much lower in stature from the shortness of the limbs, this massive animal presents us with the "ne plus ultra" of uncouth clumsiness and heavy solidity Its body like an enormous barrel supported on four thick pillars almost touches the ground, the head is ponderous, the muzzle is swollen and the great thick lips, studded with wire-like bristles, entirely conceal the projecting incisors of the lower jaw, and the huge curved tusks or canines, the mouth is wide, the nostrils open on the top of the swollen muzzle, and the eyes, which are very small, are situated high on the head, hence, when in the water, the animal by raising merely a small upper section of the head above the surface can both look around and breathe, the body remaining submerged The ears are small and pointed the tail is short and furnished with a few wiry bristles The toes, four on each foot, are tipped with small hoofs The hide is naked, coarse, and of great thickness, being two inches deep or more on the back and sides It is made into shields, whips, walking-sticks, &c Between the skin and the flesh is a layer of fat, which is salted and eaten as a delicacy by the Dutch colonists of Southern Africa, indeed, the epicures of Cape-Town, as Dr Smith says, do not disdain to use their influence with the country farmers to obtain a preference in the matter of *Sea cow's speck*, as this fat is termed when salted and dried The flesh also is excellent and in much request The general colour of the hippopotamus is dusky brownish-red, passing on the sides and limbs into a light purple red or brown, the under parts, the lips, and the eyelids are light wood brown, with a tinge of flesh colour, the hinder quarters and the under surface are freckled with spots of dusky brown, the hairs of the tail and ears are black, those on the muzzle yellowish-brown The male far exceeds the female in size The hippopotamus is gregarious in its habits sagacious, wary, and cautious It has been long driven away from the rivers within the limits of the Cape colony, but in remoter districts, where the sound of the musket is seldom heard, it abounds in every large river, and is comparatively fearless of man "To convey," says Dr Smith, "some idea of the numbers in which they were found in several of the rivers towards the tropic of Capricorn, it may suffice to state that in the course of an hour and a half a few members of the expedition party killed seven within gun-shot of their encampment Several other individuals were in the same pool, and might also have been killed, had it been desirable One of the survivors was observed to make his escape to an adjoining pool, and in accomplishing that he walked with considerable rapidity along the bottom of the river, and with his back covered with about a foot of water"

The hippopotami, according to Dr Smith, feed chiefly on grass, resorting to situations near the banks of rivers which supply that food "In districts fully inhabited by man," says Dr Smith, "they generally pass the day in the water, and seek their nourishment during the night, but in localities differently circumstanced they often pass a portion of the day as well as the night upon dry land. **In countries in which the night time constitutes the only safe period for their leaving the water, they are generally to be seen effecting their escape from it immediately before dark, or are to be heard doing so soon after the day has closed, and according to the state of the surrounding country; they then either directly commence feeding, or begin a journey towards localities where food may exist. When previous to nightfall they may have been in pools or rivers, they are generally at once enabled to commence feeding on reaching the dry land; but when they may have passed the day in the sea, they require commonly to proceed some distance after leaving it, before they find the grass which appears** congenial to their palate. It is not every description of grass that hippopotami seem to relish: they often pass over, in search of food, luxuriant grass swards, which would strongly attract many other animals which feed upon grass. Besides having a peculiar relish for the grasses of certain situations, they appear to have a predilection for districts supporting brushwood; and, owing to the latter peculiarity, they are often to be found wandering in localities on which but little grass exists, when they might have it in the neighbourhood in great abundance, but without the accompaniment of wood."

We learn from Mr Salt, that in the district of Abyssinia watered by the Tacazze, a tributary to the Nile, hippopotami are very numerous. The Abyssinians term the animal Gomari As Mr. Sal travelled along the line of the river, he found it interrupted by frequent overfalls and shallow fords. Between these shallows are holes or pits of vast depth, resembling the lochs and tarns in the mountain districts of Scotland and England It is to these depths that the hippopotami delight to resort, and here Mr Salt and his companions observed their actions, which he compares to the rolling of a grampus in the sea

"It appears," observes the same traveller, "from what we have witnessed, that the hippopotamus cannot remain more than five or six minutes at a time under water, being obliged to come up to the surface at some such interval for the purpose of respiration"

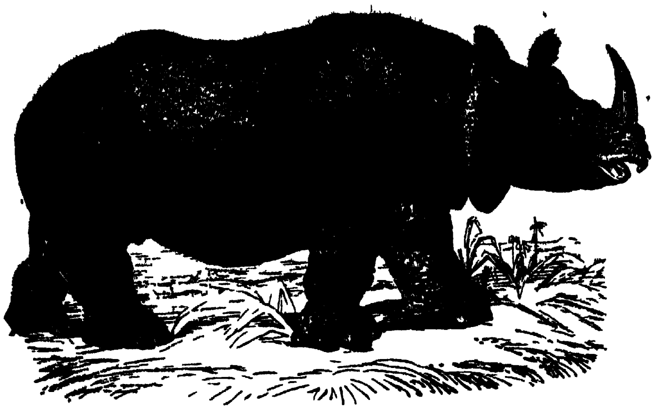
It has generally been asserted that this huge, powerful, and, it should seem, inoffensive animal has no enemy in the brute creation audacious enough to contend with it. Some travellers, however, have attributed this boldness to the crocodile, describing combats between them, which in truth never take place, no enmity subsisting between the two animals. While Mr Salt and his party were engaged shooting at the hippopotami they frequently observed several crocodiles of an enormous size rise together to the surface of the same stream, apparently regardless of and disregarded by their still more enormous neighbours Captain Tuckey, in his expedition to explore the Zaire or Congo, observed immense numbers of hippopotami and alligators in the same water—an association inconsistent with hostility

Burckhardt (see his 'Travels in Nubia') informs us that lower down the Nile, in Dongola, where there are neither elephants nor rhinoceroses, the hippopotamus is very common The Arabic name for it is Barnik It is a dreadful scourge to the inhabitants, who lack the means of destroying it. Occasionally, but rarely, it is seen much farther north, even below the cataract of the Nile at Assouan

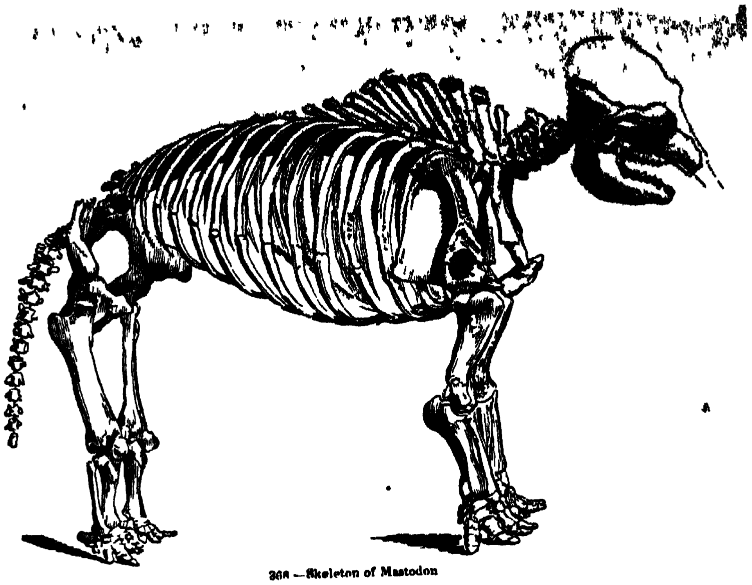
The hippopotamus abounds in the Niger, where it was seen by Richard and John Lander Clapperton observed them in the lake Muggaby, Bornou, and in the great lake Tchad and its tributary rivers.

Quiet and inoffensive, it is only when attacked that the hippopotamus becomes furious, and if hard pressed on land, he rushes open-mouthed with the utmost desperation on his aggressor If the party attacking the animal in his watery domicile be in a boat, their danger is extreme. Captain Owen ('Narrative of Voyages to explore the shores of Africa, under Captain W F. W. Owen') had many encounters with these animals. While examining a branch of the Temby river, in Delagoa Bay, a violent shock was suddenly felt from underneath the boat, and "in another moment a monstrous hippopotamus reared itself up from the water, and in a most ferocious and menacing attitude rushing open-mouthed at the boat, with one grasp of its tremendous jaws seized and tore seven planks from her side, the creature disappeared for a few seconds, and then rose again, apparently intending to repeat the attack, but was fortunately deterred by the contents of a musket discharged in its face The boat rapidly filled, but as she was not more than an oar's length from the shore, they (the crew) succeeded in reaching it before she sank. The keel, in all probability, had touched the back of the animal, which, irritating him, occasioned this furious attack; and, had he got his upper jaw above the gunwale, the whole broadside must have been torn out. The force of the shock from beneath, previously to the attack, was so violent, that her stern was almost lifted out of the water, and Mr. Tamba, the midshipman steering, was thrown overboard, but fortunately rescued before the irritated animal could seize him.

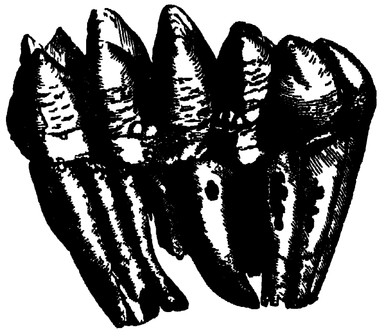
Fig. 374 represents the skeleton of the hippopotamus, which is a ponderous frame-work in unison



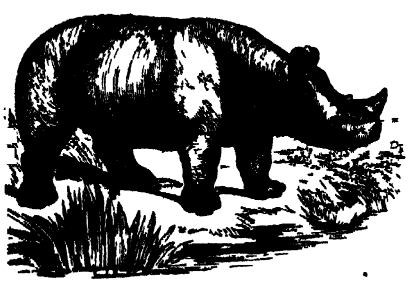
375.—Rhinoceros.



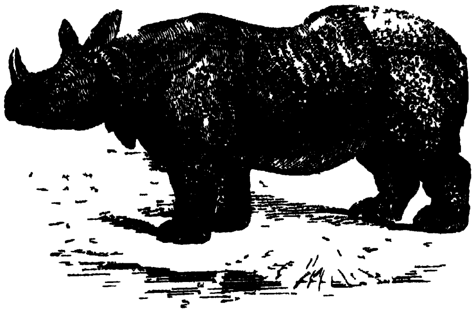
368.—Skeleton of Mastodon



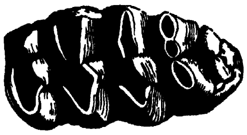
369.—Molar of Mastodon not worn



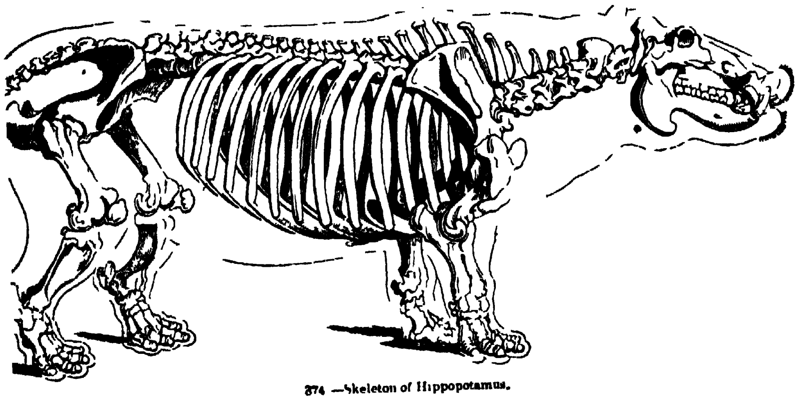
377.—African Rhinoceros



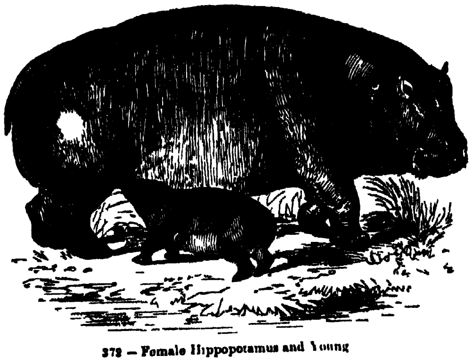
380.—Indian Rhinoceros



370.—Molar of Mastodon much worn



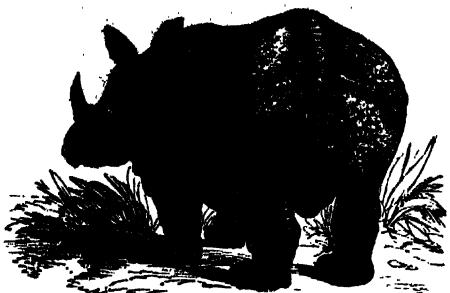
374.—Skeleton of Hippopotamus.



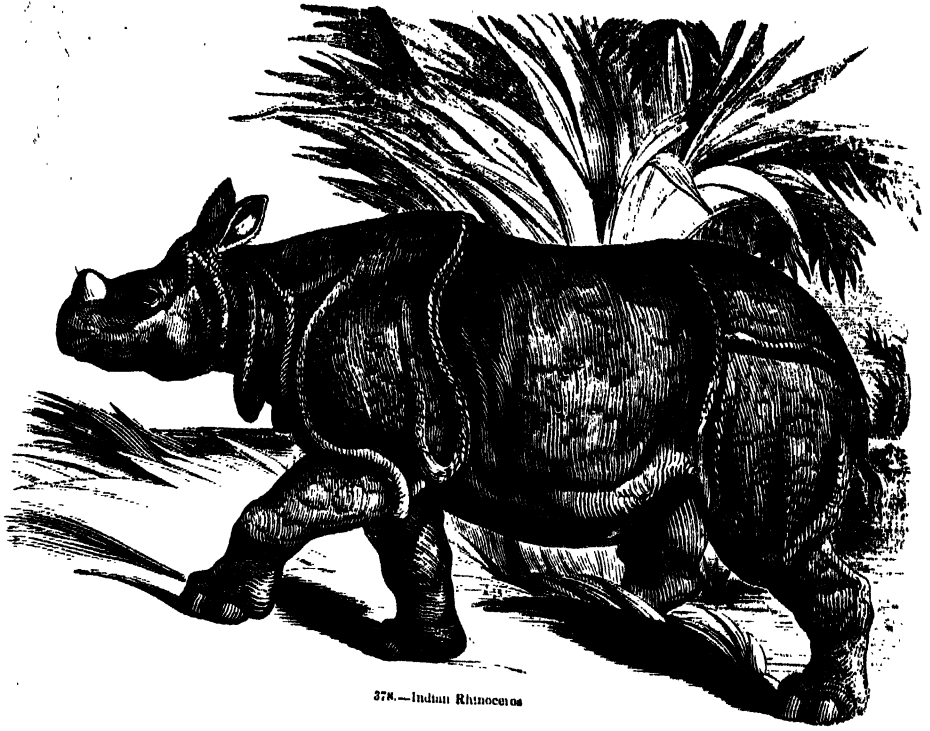
372.—Female Hippopotamus and Young

371.—Hippopotamus.

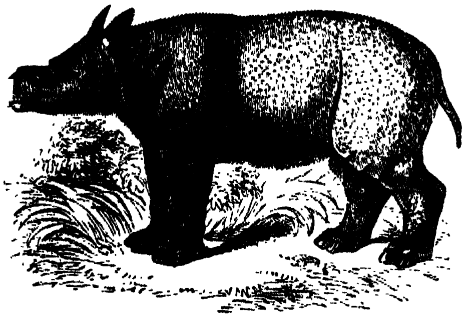
376.—Indian Rhinoceros.



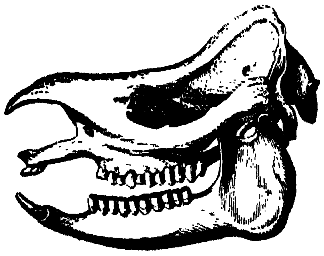
381.—Indian Rhinoceros.



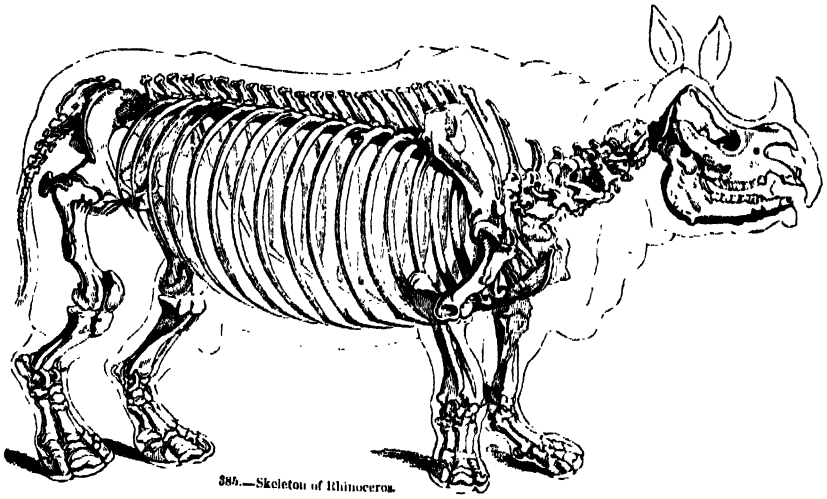
378.—Indian Rhinoceros



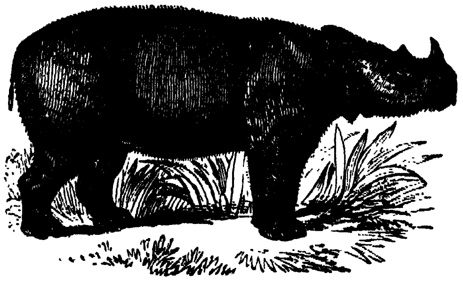
382.—Javanese Rhinoceros.



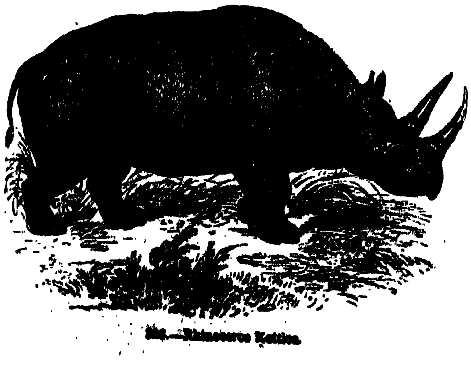
384.—Skull of Javanese Rhinoceros



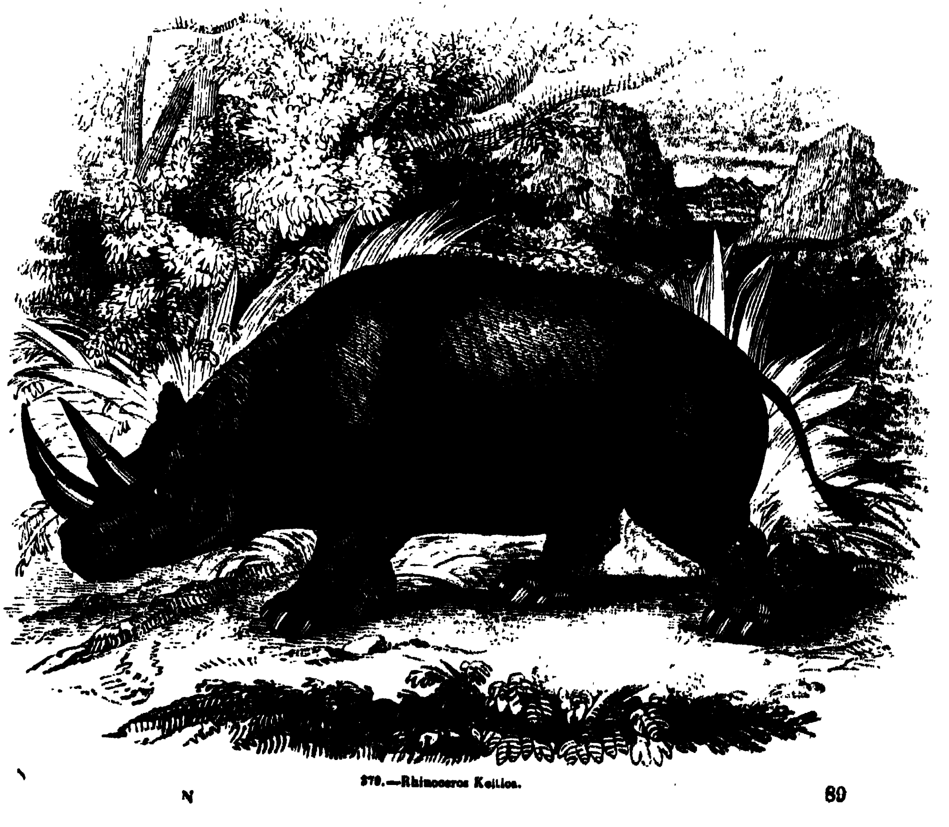
385.—Skeleton of Rhinoceros.



383.—Sumatran Rhinoceros.



380.—Rhinoceros Keitloa.



379.—Rhinoceros Keitloa.

N

with the vast weight of solid flesh to be sustained and the enormous strength of the muscles. The neck, though short, is longer in proportion than that of the elephant, and from the shortness of the limbs gives the animal the power of grazing the herbage.

Four fossil species of hippopotamus are described by Cuvier; of one (H. antiquus) the relics are widely distributed, and are particularly abundant in the Val d'Arno, Italy, intermixed with those of the elephant and rhinoceros.

375—The Rhinoceros.

This genus contains six living and well-established species, as far as naturalists are at present able to determine, and several fossil species, of which the relics occur in the same strata as those of the fossil elephant.

The existing species are confined to the hotter regions of the Old World, and are divided between Africa and India, including the islands of Java and Sumatra. It is in the land of the elephant and the hippopotamus that the rhinoceros wanders in fearless confidence, as if aware of his enormous powers, and the advantage of his weapons of defence. One species (Rh. Indicus; Figs. 375, 376, 378, 380, and 381) is peculiar to continental India beyond the Ganges, Siam, and Cochin China; one (Rh. Javanus: Fig. 382) is a native of Java; and one with two horns (Rh. Sumatranus: Fig. 383), of Sumatra. Three two-horned species are indigenous in Africa, viz.: the common two-horned or black rhinoceros (Rh. bicornis, Linn.; Africanus, Cuv.: Figs. 377, 387); the white rhinoceros (Rh. simus: Figs. 388, 389): and the Keitloa (Rh. Keitloa: Figs 379 and 386), discovered by Dr. Smith during his expedition into the interior. We may here add that though Bruce and Salt notice the existence of a two-horned rhinoceros in Abyssinia different from the common species of South Africa,* there is some reason to believe in the existence of a single-horned species in that region. Bruce states that a one-horned rhinoceros is found towards Cape Gardafui, according to the accounts of the natives in the kingdom of Adel. Accounts of such an animal were received by Dr. Smith from the natives in the interior of South Africa, who represented it as living far up the country; moreover Burckhardt alludes to a one-horned species in the territory above Sennaar, and states that the inhabitants there give it the name of the "mother of the one horn." According to this traveller, its northern boundary, like that of the elephant, is the range of mountains to the north of Abou Huaze, two days' journey from Sennaar. The hide of this animal is manufactured into shields, which have an extensive sale; the material of the horn is also sold, and at a high price, Burckhardt having seen four or five Spanish dollars paid for a piece four inches long and one inch thick. Was the one horned rhinoceros seen by Strabo at Alexandria this species or the common Indian?—and the same question applies to the one-horned rhinoceros, which, with a hippopotamus, was given by Augustus, in the celebration of his triumph over Cleopatra, to be slain in the Circus; which animals, Dion Cassius says, were then first seen and killed at Rome—an assertion perfectly erroneous, as it respects the rhinoceros, if it was the common Indian species, for Pliny, in his eighth book, alluding to the games of Pompey, mentions the one-horned rhinoceros (Indian, it is presumed) as then exhibited ("Iisdem ludis, et rhinoceros unius in nare cornu, qualis sæpe visus"). With respect to the two-horned African species, it was also exhibited in Rome; and had learned critics known anything of natural history, the line in Martial ("namque gravem *gemino cornu* sic extulit ursum") would not have given rise to so many futile disquisitions and attempted corrections. Pausanias describes a two-horned rhinoceros under the name of Æthiopian Bull. Two individuals of the same species appeared at Rome under the emperor Domitian, on some of whose medals was impressed their figure; others were exhibited under Antoninus, Heliogabalus, and Gordian III. Martial lived in the time of Domitian, and the rhinoceros "gemino cornu" was doubtless seen by him.

The animals of the present genus are all remarkable for the massiveness of their form and the clumsiness of their proportions; they are, however, more prompt and rapid than might be at first supposed, and when attacked they rush on their foes with headlong impetuosity. The body is of great bulk, and protuberant at the sides; the neck is short and deep; the shoulders are heavy, the limbs thick; the feet are divided into three toes incased in hoofs. The skin is thick and coarse, with a knotty or tuberculous surface, and destitute, or nearly so, of hairs. In the common Indian species it is disposed in large folds, especially on the neck, shoulders, haunches, and thighs. The eyes are small, placed nearer the nose than in other quadrupeds, and high towards the upper surface of the skull; the ears are moderate and erect. The head is large and ponderous: it is elevated between the ears, whence it sweeps with a concave line to the nasal bones, which rise in the form of an arch to support the horn (see skeleton, Fig. 385). The upper lip is soft, flexible, sensitive, capable of being protruded, and used to a certain degree as an organ of prehension.

But that which gives most character to the head of the rhinoceros is its horn, single in some species, double in others. This organ is of an elongated, recurvent, conical figure, arising from a broad, limpet-shaped base, seated on the nasal bones, which are of a thickness and solidity not to be found in other races of quadrupeds. They form a vaulted roof, elevated in a remarkable degree above the intermaxillary bones, containing the incisor teeth, and their upper arched surface is rough with numerous irregularities and depressions; and here we may pause, to reflect on the advantages gained by their form and structure. They have not merely to sustain the weight of the horn, no trifle in itself, but to resist the shock occasioned by the violent blows which the animal gives with the weapon upon various occasions. Hence, conjoined with their solidity, that form is given to the nasal bones which, of all others, is best calculated for sustaining a superincumbent weight or sudden jars; while the rugosities and depressions tend to the firmer adhesion of the skin, to which the horn is immediately attached. In the two-horned species the posterior horn rests on the os frontis. The nasal horn of the rhinoceros is a solid mass, structurally composed of agglutinated fibres analogous to hair, and much resembling those into which whalebone is so easily separable.

It has been asserted by some travellers that the horns of the African species are moveable, and that the animal rattles them against each other: this, however, is a mistake—they are firmly fixed. The nostrils are on each side of the upper lip; the tongue is perfectly smooth, contrary to what is alleged by many of the older writers, who describe it to be covered with spines, and capable of lacerating the skin. The senses of smell and hearing are very acute. Dentition variable: canines wanting. In the Indian rhinoceros the formula is as follows:—Incisors, $\frac{4}{4}$; Molars, $\frac{7-7}{7-7} = 36$.

376, 378.—The Indian Rhinoceros

in his native regions leads a tranquil, indolent life: like the elephant, he gives preference to the marshy borders of lakes and rivers, or swampy woods and jungles, delighting to roll and wallow in the oozy soil, and plaster his skin with mud. He is also fond of the bath, and swims with ease and vigour. The splendid animal in the gardens of the Zoological Society may be often seen during the hot weather of summer enjoying the bath in the paddock appropriated for his exercise, or rolling and wallowing in the mud, or basking luxuriously, half in, half out, of the water, like a huge hog, uttering every now and then a low grunt of self-complacent satisfaction.

Sluggish in his habitual movements, the rhinoceros wanders through his native plains with a heavy step, carrying his huge head so low that his nose almost touches the ground, and stopping at intervals to crop some favourite plant, or, in playful wantonness, to plough up the ground with his horn, throwing the mud and stones behind him. The jungle yields before his weight and strength, and his track is said to be often marked by a line of devastation. When roused the rhinoceros is a most formidable antagonist, and such is the keenness of his senses of smell and of hearing, that, unless by very cautiously approaching him against the direction of the wind, it is almost impossible to take him by surprise. On the appearance of danger the rhinoceros generally retreats to his covert in the tangled and almost impenetrable jungle, but not always, and instances are on record in which, snuffing up the air and throwing his head violently about, he has rushed with fury to the attack, without waiting for the assault. There are, in fact, seasons in which the rhinoceros is very dangerous, and attacks every animal with impetuosity that attracts his notice or ventures near his haunts, even the elephant himself.

From the earliest times the horn of the Indian rhinoceros (the observation applies to other species also) has been regarded either as an antidote against poison or as efficacious in detecting its presence, as well as useful in curing disease. The Indian kings made use of it at table, because, as was believed, "it sweats at the approach of any kind of poison whatever." Goblets made of it are in high estimation; these are often set with gold or silver, and sell for large sums: when poison is poured into them, the liquor, it is said, betrays its noxious qualities by effervescing till it runs over the brim: water drank from them, or from the cup-like hollow at the base of the horn, is regarded as medicinal. In the latter case the water is to be stirred in the hollow with the point of an iron nail till it becomes discoloured, when the patient must drink it.

The strong deep folds into which the coarse skin is gathered in the cheeks, neck, shoulders, haunches, and thighs are distinguishing characters of the Indian rhinoceros. The general colour of the skin is dusky black, with a slight tint of purple. Mr. Hodgson ('Proceedings of the Zoological Society,' 1834) states that the female goes from 17 to 18 months with young, and produces one at a birth: he adds also, "It is believed that the animal lives for 100 years: one taken mature was kept at Katmandoo for 35 years without exhibiting any symptoms of approaching decline. The young continues to suck for nearly two years: it has for a month after birth a pink suffusion over the dark colour proper to the mature hide." The female is desperate in the protection of her young.

382.—The Javanese Rhinoceros

(*Rh. Javanus*). As far as is ascertained, this species is confined to the island of Java, where it is called Warak. In the character of the incisor teeth, and the horn being single, it agrees with the Indian species; but it is a less bulky animal, and in proportion, more elevated in the limbs; the folds of the skin are both less numerous, less deep, and also differently arranged; the surface of the skin is divided into small polygonal tubercles with a slight central depression in each, from which arise a few short bristly hairs. In its habits this species is gregarious; its range on the island extends from the level of the ocean to the summits of mountains of considerable elevation—the latter situations are preferred; its retreats in these mountains are to be discovered by deeply-excavated passages worked out on their declivities. When met with, or otherwise disturbed, it quietly retires, being very mild and peaceable. Night is the principal season of its activity, and it often commits considerable damage in the plantations of coffee and pepper. The horns and skin are employed for medicinal purposes by the natives. Dr. Horsfield ('Zoological Researches in Java') gives a detailed account of one of these animals which was kept at Surakarta, and which was very mild and tractable, allowing persons even to mount on its back. In its habit of wallowing in the mire it resembled the rest of the genus. The Javanese Rhinoceros was known to Bontius, who wrote on the productions of that island in 1629. Fig. 384 represents the skull of this species, which is more elongated in proportion and less heavily made than that of the Indian animal.

383.—The Sumatran Rhinoceros

(*Rh. Sumatranus*, Raffles) was first described by Mr Bell, surgeon in the service of the East India Company, at Bencoolen ('Philosophical Transactions, 1793); but it appears to have been indicated previously by Mr. C. Miller, long resident in Sumatra (Pennant's 'History of Quadrupeds,' 3rd ed., vol. i.). The head is more elongated than in the other two species, and there are two horns on the nose: the neck is thick and short, the limbs massive; the skin is rough and black, and covered with short hair; the folds are very inconsiderable, but are most distinct on the neck, shoulders, and haunches. The female is stated to have a heavier head than the male. The number of incisors is four in each jaw, but of these the lateral ones are very small and soon fall out; hence Bell and others supposed the number to be only two.

The Sumatran rhinoceros is by no means bold or savage; one of the largest size has been seen to run away from a single wild dog. Its native name is Badak, whence the term Abadia, or Abath, applied to the Indian rhinoceros by our early navigators. Sir S. Raffles says that, besides this species, there is another animal in the forests of Sumatra, never noticed, which in size and character nearly resembles this rhinoceros, but which is said to have a single horn, and to be distinguished by a narrow white belt encircling the body. The natives of the interior term it Tennu, which, at Malacca, is the name of the Tapir; but in Sumatra the name of the Tapir is Gindol and Babialu. In the interior, however, where different tribes shut out from general communication speak different dialects, it is probable that the term Tennu may be the name applied by some, as at Malacca, to the tapir, and hence would the confusion arise; for, from the description, notwithstanding the assertion that it possesses a horn, we cannot help regarding this Tennu of the forest of the interior as the tapir.

Of the African species of rhinoceros we may first notice the

377, 387.—Black or Common African Rhinoceros

(*Rh. bicornis*, Linn.; *Rh. Africanus*, Cuv.). This huge animal, though driven from the precincts of the colony, is still extensively spread throughout the southern regions of Africa. When the Dutch first formed their settlement on the shores of Table Bay, this rhinoceros was a regular inhabitant of the thickets which clothed the lower slopes of the mountain; but it has retired, and, continues to retire, before the advance of colonization and the gun of the hunter. This species differs from the Indian, not only in the possession of a double horn, but in the absence of massive folds of skin, and in wanting the incisor teeth. The skin is thick, coarse, scabrous, and forms a deep furrow round the short thick neck; the head is heavy; the eyes are small, and the skin round them, and on the muzzle, and before the ears, is wrinkled; the upper lip is slightly produced, and prehensile. The anterior horn is long, fibrous at the base, hard, and finely polished at the point; the posterior horn is short and conical. General colour yellowish brown, with tints of purple upon the sides of the head and muzzle; eyes dark brown. Length about eleven feet. A few black hairs fringe the edge of the ears and the tip of the tail. This animal feeds upon brushwood, and the smaller branches of dwarf trees, "from which circumstance," says Dr. Smith, "it is invariably found frequenting wooded districts, and in those situations its course may be often traced by the mutilations of the bushes. The mass of vegetable matter consumed does not appear to be in proportion to the bulk of the animal: indeed, as it feeds but slowly, and passes much of its time in idleness, it must be regarded as a very moderate eater, and, considering that it appears to be fastidious in the choice of its food, it is fortunate for its comfort that it does not require more nourishment." Of the senses of the rhinoceros, those of hearing and smell are very acute, and aid the animal more than his sight in the discovery of danger, the bulk of the body screening objects not immediately before the eyes. "As these animals depend much upon smell for their existence and safety, it is necessary to advance upon them from the leeward side, if the aim be to get close without being discovered. In pursuit they also trust for guidance to the same sense, and may be heard forcibly inspiring the air, when they have lost the scent of the object they are following. The ticks and other insects with which they are covered furnish for them another source of intelligence, inasmuch as they attract a number of birds, which sit quietly picking them off, when nothing strange is in sight, but fly away when any object excites their fear. So well does the rhinoceros understand this, that he proceeds feeding with the greatest confidence while the birds continue perched upon his back; but the moment they fly, the huge animal raises his head and turns it in all directions to catch the scent. Whether he accomplishes this or not, he generally feels so uncertain of his position, that he moves to some other locality." The same observations apply to the other African species. When disturbed or attacked, the rhinoceros becomes furious, and especially when wounded: he then rushes towards his foe, and if he can get the hunter once within his sight, the escape of the latter, unless he exert great presence of mind, or the well-directed shot of a companion stop the animal in his career, is very doubtful. The best plan is to wait till the enraged beast approaches, and then step aside suddenly, where some bush or inequality of the ground may afford a shelter, and give time to the hunter for reloading his gun before the rhinoceros gets sight of him again, which fortunately it does slowly and with difficulty. Travellers in the regions frequented by this animal are not safe during the night from its attacks. It appears to be excited by the glow of a fire, towards which it rushes with fury, overturning every obstacle. It has, indeed, been known to rush with such rapidity upon a military party lodged among the bush covering the banks of the Great Fish River, that before the men could be aroused it had severely injured two of them, tossed about and broken several guns, and completely scattered the burning wood. Le Vaillant, in an animated account of a rhinoceros hunt, describes the enraged and wounded animals as ploughing up the ground with their horns, and throwing a shower of pebbles and stones around them: and Dr. Smith says that they are sometimes seen to plough up the earth for several paces with the front horn when not enraged, but for what object he could not discover. The native (Bechuana) name of this species is Borili.

---

* A pair of horns brought by Salt from Abyssinia, and now in the museum of the Royal College of Surgeons, more nearly resemble those of the Keitloa than of the R. bicornis; and Dr. Smith considers a pair brought by Major Denham from North Africa to be different again, and unlike those of any other species. Clubs of rhinoceros-horn, of about three feet in length, have been brought from Dahomey, Western Africa. It is evident that there are two or three species in Africa with which naturalists are not acquainted.

379, 386.—THE KEITLOA

(*Rh. Keitloa*, Smith). In general figure this savage species resembles most nearly the common African rhinoceros. There are, however, he observes, many marked differences between them, of which the following are a few of the external and more palpable. In Rhinoceros Keitloa the two horns are of equal or nearly equal length; in Rhinoceros Africanus the posterior in neither sex is ever much beyond a third of the length of the anterior horn; the length of the head in proportion to the depth is very different in the two. The neck of Rhinoceros Keitloa is much longer than that of the other, and the position and character of the cuticular furrows destined to facilitate the lateral motions of the head are very different. Besides these, Dr. Smith states that many other diagnostic characters might be instanced; such as the black mark on the inside of the thigh of the Keitloa, the distinctly produced tip of the upper lip, and the comparatively few wrinkles on the snout and parts around the eyes.

The first example of this animal which Dr. Smith met with, during his expedition, was shot about 180 miles N.E. of Lattakoo, but considerably south of the country to which the species appears directly to belong, and from which it might be considered as a wanderer. On the expedition penetrating to the northward of Kurrichane, every one was found conversant with the name and able to direct to situations where the animal was found. Few mentioned the Keitloa without alluding to its vindictive temper and ferocity; and those, says Dr. Smith, who had sufficient confidence in the party, compared to it a chief, then awfully oppressing that part of the country, and spoke of the man and the animal as alike to be feared. As the party advanced, the Keitloa became more common, though it never occurred in such numbers as the other two species.

"The interest," says Dr. Smith, "which the discovery of this species excited, led to the making of minute inquiries as to the animals of this genus; and the expedition had sufficient reason to believe, from the replies to constant questions, that two other undescribed species existed farther in the interior, one of which was described as being something like the Keitloa, and having two horns—the other as differing in many respects, and having only *one* horn. The Keitloa browses on shrubs and the slender branches of brushwood, using the upper lip as an organ of prehension."

388, 389.—THE WHITE OR BLUNT-NOSED RHINOCEROS

(*Rh. simus*), termed Mohoohoo by the Bechuanas, is larger than the two former species, being upwards of twelve feet in length, and nearly six feet in height. It is a huge, massive animal, with the neck longer than in the other African species, having three deep wrinkles running from the nape down the sides; the muzzle is truncate, the mouth shaped like that of an ox, the upper lip perfectly square, and destitute of the mobility and power of protrusion which it exhibits in the other species. Hence, instead of browsing upon shrubs, it feeds principally upon grass, and therefore frequents open plains where such herbage abounds, wandering very extensively in search of pasturage. This animal was first described by Mr. Burchell, who when at Lattakoo found it in abundance there, and Mr. Campbell brought the head of one to England. In the Mohoohoo the horns are situated close to the extremity of the nose: the first is very long, tapered to a point, and slightly curved back; the second is short, conical, and obtuse. The general colour is pale broccoli-brown; the buttocks, shoulders, and under parts shaded with brownish purple; tail clothed with stiff black hair. According to Dr. Smith, the introduction of fire-arms among the Bechuanas has rendered this animal rare in the district where Mr. Burchell found it numerous: higher up the country, however, it still maintains its ground. In disposition it differs from the other two species, being much more gentle, and is therefore regarded with less fear than either the Keitloa or the Borili.

The flesh of all three species is esteemed wholesome food by the natives, who dig pit-falls for them in situations to which they are known to resort; and sometimes, though rarely with success, attempt to kill them with the assagai or spear. In style of motion they are all alike, and so awkward that their swiftness is to be appreciated not by directly watching the animal itself, but by fixing the eye upon some two points between which it takes its course. To revert to the one-horned rhinoceros, of which Dr. Smith heard in the interior of South Africa, and of which Bruce and Burckhardt received accounts as existing in Adel and the country south of Sennaar, it may be added that Dr. Smith adduces the testimony of Mr. Freeman respecting an animal by no means rare in Makooa, north of the Mosambique Channel, which, overlooking the absurdities and exaggeration of the description, he suspects to be a one-horned rhinoceros, and probably that of which he heard, and which may extend to the countries mentioned by Bruce and Burckhardt.

Among the fossil relics of animals which at some former period have tenanted this globe, and after a quiet possession, generation succeeding generation, of their pasture-lands, have become as it were blotted out of the book of creation, those of the rhinoceros are extremely abundant, little less so, if at all, than those of the fossil elephant or mammoth, as widely distributed and occurring in the same strata and the same localities. Several species have been distinctly made out, among which the most remarkable is that with a bony partition between the nostrils, and supporting the nasal bones; it is termed by Cuvier Rh. tichorhinus. Fig. 390 represents the skull in two views: *a*, profile; *b*, seen from below.

It was of this species that Pallas in 1771 discovered an entire frozen carcass buried in the sand on the banks of the Wilouji or Viloui, which joins the Lena, in Siberia. Happily, therefore, we know the form and true proportions of the living animal. The skin was smooth and destitute of folds, and, like the common African rhinoceros, the animal had two horns. The feet had three toes, as in all extant species, but the hoofs were lost. Like the mammoth of Siberia, this animal was originally covered with hair: in many parts of the skin this hair still remained, especially over the feet, where it was very abundant, measuring from one to three inches in length, of a stiff quality, and of a dusky grey. The head was invested with a similar clothing. The head and feet are preserved in their natural state in the museum of St. Petersburg.

The skull of this species differs from that of the two-horned African rhinoceros, not only in the presence of the osseous nasal partition, but in general form and proportions. The length and narrowness of the skull are very remarkable, as is also the space between the orbits, which is much more contracted than in the common two-horned species, and the nasal bones are far more elongated. In the two-horned rhinoceros the disc which bears the anterior horn is a semi-sphere, in this an oblong ellipse, and a disc of similar figure supports the second horn, whence it may be safely concluded that the horns of this fossil species were strongly compressed at the sides. The occipital ridge is elevated and drawn out backwards, so that from the highest point the occipital bone slopes at a very acute angle inwards to the condyles.

About nine fossil species of rhinoceros are described. Almost every bone-cavern in England, France, and Germany has afforded them in abundance; and Dr. Buckland proves that there must have been a long succession of years in which the elephant, hippopotamus, and rhinoceros, with the hyæna, inhabited our island; and that the former, as the bones testify, became the prey of the latter, or were devoured after natural or accidental death.

391, 392, 393.—THE DAMAN, OR HYRAX.

When we look at the rabbit-like hyrax, it does not surprise us to find that all the older naturalists regarded it as a Rodent, and placed it in that order. It was reserved for Cuvier to point out its true situation. "There is no quadruped," says this great man, "which proves more forcibly than the daman the necessity of having recourse to anatomy, as a test by which to determine the true relationship of animals." This fur-covered active creature is a true Pachydermatous animal, and, notwithstanding the smallness of its size, it is to be regarded as "intermediate between the rhinoceros and tapir." The resemblance which the hyrax bears to the former may be traced in its osseous system and internal anatomy (see 'Proceeds. Zool. Soc.' 1832 and 1835). On these points it would here be out of place to dwell; we have, however, figured the skeleton (Fig. 394) and the skull (Fig. 395), which to many will be of interest. With respect to the latter, the singular depth of the lower jaw cannot but strike every attentive observer; and it may be added that in the convexity of the posterior edge of the ascending portion it surpasses that even of the tapir, which, in this respect, is the nearest among all animals to the hyrax. In other particulars the skull approaches that of the rhinoceros; the molar teeth, in fact, are those of the rhinoceros in miniature, both as to form and number. There are, as in the rhinoceros, no canines. The upper incisors, two in number, are long, triangular, pointed, stout, and separated from each other by a small interval. The lower incisors are four in number, set in close array, flat, and directed forwards. At first their edges are notched, but they become smooth by use The molars are seven on each side, above and below: but the first, which is small, falls out, being worn down as soon as the last molar on each side has arisen; and, in old individuals, the next is frequently wanting also.

With respect to the skeleton, it may be remarked that there are 21 ribs on each side, a number greater than in any other quadruped, except the two-toed sloth, which has 23. The elephant and tapir follow the hyrax. The fore-feet are divided into four toes, tipped with hoof-like nails; the hind-feet into three, of which the innermost is furnished with a long claw-like nail. The toes are all buried in the skin, as far as the little hoofs, precisely as in the rhinoceros.

Several species belong to the present genus: we have figured the Cape Hyrax or Daman (Fig. 391) with the vast weight of solid flesh to be sustained and the enormous strength of the muscles. The neck, though short, is longer in proportion than that of the elephant, and from the shortness of the limbs gives the animal the power of grazing the herbage.

Four fossil species of hippopotamus are described by Cuvier; of one (H. antiquus) the relics are widely distributed, and are particularly abundant in the Val d'Arno, Italy, intermixed with those of the elephant and rhinoceros.

375—THE RHINOCEROS.

This genus contains six living and well-established species, as far as naturalists are at present able to determine, and several fossil species, of which the relics occur in the same strata as those of the fossil elephant.

The existing species are confined to the hotter regions of the Old World, and are divided between Africa and India, including the islands of Java and Sumatra. It is in the land of the elephant and the hippopotamus that the rhinoceros wanders in fearless confidence, as if aware of his enormous powers, and the advantage of his weapons of defence. One species (Rh. Indicus; Figs. 375, 376, 378, 380, and 381) is peculiar to continental India beyond the Ganges, Siam, and Cochin China; one (Rh. Javanus: Fig. 382) is a native of Java; and one with two horns (Rh. Sumatranus: Fig. 383), of Sumatra. Three two-horned species are indigenous in Africa, viz.: the common two-horned or black rhinoceros (Rh. bicornis, Linn.; Africanus, Cuv.: Figs. 377, 387); the white rhinoceros (Rh. simus: Figs. 388, 389): and the Keitloa (Rh. Keitloa: Figs 379 and 386), discovered by Dr. Smith during his expedition into the interior. We may here add that though Bruce and Salt notice the existence of a two-horned rhinoceros in Abyssinia different from the common species of South Africa,* there is some reason to believe in the existence of a single-horned species in that region. Bruce states that a one-horned rhinoceros is found towards Cape Gardafui, according to the accounts of the natives in the kingdom of Adel. Accounts of such an animal were received by Dr. Smith from the natives in the interior of South Africa, who represented it as living far up the country; moreover Burckhardt alludes to a one-horned species in the territory above Sennaar, and states that the inhabitants there give it the name of the "mother of the one horn." According to this traveller, its northern boundary, like that of the elephant, is the range of mountains to the north of Abou Huaze, two days' journey from Sennaar. The hide of this animal is manufactured into shields, which have an extensive sale; the material of the horn is also sold, and at a high price, Burckhardt having seen four or five Spanish dollars paid for a piece four inches long and one inch thick. Was the one horned rhinoceros seen by Strabo at Alexandria this species or the common Indian?—and the same question applies to the one-horned rhinoceros, which, with a hippopotamus, was given by Augustus, in the celebration of his triumph over Cleopatra, to be slain in the Circus; which animals, Dion Cassius says, were then first seen and killed at Rome—an assertion perfectly erroneous, as it respects the rhinoceros, if it was the common Indian species, for Pliny, in his eighth book, alluding to the games of Pompey, mentions the one-horned rhinoceros (Indian, it is presumed) as then exhibited ("Iisdem ludis, et rhinoceros unius in nare cornu, qualis sæpe visus") With respect to the two-horned African species, it was also exhibited in Rome; and had learned critics known anything of natural history, the line in Martial ("namque gravem *gemino cornu* sic extulit ursum") would not have given rise to so many futile disquisitions and attempted corrections. Pausanias describes a two-horned rhinoceros under the name of Æthiopian Bull. Two individuals of the same species appeared at Rome under the emperor Domitian, on some of whose medals was impressed their figure; others were exhibited under Antoninus, Heliogabalus, and Gordian III. Martial lived in the time of Domitian, and the rhinoceros "gemino cornu" was doubtless seen by him.

The animals of the present genus are all remarkable for the massiveness of their form and the clumsiness of their proportions; they are, however, more prompt and rapid than might be at first supposed, and when attacked they rush on their foes with headlong impetuosity. The body is of great bulk, and protuberant at the sides; the neck is short and deep; the shoulders are heavy, the limbs thick; the feet are divided into three toes incased in hoofs. The skin is thick and coarse with a knotty or tuberculous surface, and destitute, or nearly so, of hairs. In the common Indian species it is disposed in large folds, especially on the neck, shoulders, haunches, and thighs. The eyes are small, placed nearer the nose than in other quadrupeds, and high towards the upper surface of the skull; the ears are moderate and erect. The head is large and ponderous: it is elevated between the ears, whence it sweeps with a concave line to the nasal bones, which rise in the form of an arch to support the horn (see skeleton, Fig. 385). The upper lip is soft, flexible, sensitive, capable of being protruded, and used to a certain degree as an organ of prehension.

But that which gives most character to the head of the rhinoceros is its horn, single in some species, double in others. This organ is of an elongated, recurvent, conical figure, arising from a broad, limpet-shaped base, seated on the nasal bones, which are of a thickness and solidity not to be found in other races of quadrupeds. They form a vaulted roof, elevated in a remarkable degree above the intermaxillary bones, containing the incisor teeth, and their upper arched surface is rough with numerous irregularities and depressions; and here we may pause, to reflect on the advantages gained by their form and structure. They have not merely to sustain the weight of the horn, no trifle in itself, but to resist the shock occasioned by the violent blows which the animal gives with the weapon upon various occasions. Hence, conjoined with their solidity, that form is given to the nasal bones which, of all others, is best calculated for sustaining a superincumbent weight or sudden jars; while the rugosities and depressions tend to the firmer adhesion of the skin, to which the horn is immediately attached. In the two-horned species the posterior horn rests on the os frontis. The nasal horn of the rhinoceros is a solid mass, structurally composed of agglutinated fibres analogous to hair, and much resembling those into which whalebone is so easily separable.

It has been asserted by some travellers that the horns of the African species are moveable, and that the animal rattles them against each other: this, however, is a mistake—they are firmly fixed. The nostrils are on each side of the upper lip; the tongue is perfectly smooth, contrary to what is alleged by many of the older writers, who describe it to be covered with spines, and capable of lacerating the skin. The senses of smell and hearing are very acute. Dentition variable: canines wanting. In the Indian rhinoceros the formula is as follows:—Incisors, $\frac{4}{4}$; Molars, $\frac{7-7}{7-7} = 36$.

376, 378.- THE INDIAN RHINOCEROS

in his native regions leads a tranquil, indolent life: like the elephant, he gives preference to the marshy borders of lakes and rivers, or swampy woods and jungles, delighting to roll and wallow in the oozy soil, and plaster his skin with mud. He is also fond of the bath, and swims with ease and vigour. The splendid animal in the gardens of the Zoological Society may be often seen during the hot weather of summer enjoying the bath in the paddock appropriated for his exercise, or rolling and wallowing in the mud, or basking luxuriously, half in, half out, of the water, like a huge hog, uttering every now and then a low grunt of self-complacent satisfaction.

Sluggish in his habitual movements, the rhinoceros wanders through his native plains with a heavy step, carrying his huge head so low that his nose almost touches the ground, and stopping at intervals to crop some favourite plant, or, in playful wantonness, to plough up the ground with his horn, throwing the mud and stones behind him. The jungle yields before his weight and strength, and his track is said to be often marked by a line of devastation. When roused the rhinoceros is a most formidable antagonist, and such is the keenness of his senses of smell and of hearing, that, unless by very cautiously approaching him against the direction of the wind, it is almost impossible to take him by surprise. On the appearance of danger the rhinoceros generally retreats to his covert in the tangled and almost impenetrable jungle, but not always, and instances are on record in which, snuffing up the air and throwing his head violently about, he has rushed with fury to the attack, without waiting for the assault. There are, in fact, seasons in which the rhinoceros is very dangerous, and attacks every animal with impetuosity that attracts his notice or ventures near his haunts, even the elephant himself.

From the earliest times the horn of the Indian rhinoceros (the observation applies to other species also) has been regarded either as an antidote against poison or as efficacious in detecting its presence, as well as useful in curing disease. The Indian kings made use of it at table, because, as was believed, "it sweats at the approach of any kind of poison whatever." Goblets made of it are in high estimation; these are often set with gold or silver, and sell for large sums: when poison is poured into them, the liquor, it is said, betrays its noxious qualities by effervescing till it runs over the brim: water drank from them, or from the cup-like hollow at the base of the horn, is regarded as medicinal. In the latter case the water is to be stirred in the hollow with the point of an iron nail till it becomes discoloured, when the patient must drink it.

The strong deep folds into which the coarse skin is gathered in the cheeks, neck, shoulders, haunches, and thighs are distinguishing characters of the Indian rhinoceros. The general colour of the skin is dusky black, with a slight tint of purple. Mr. Hodgson ('Proceedings of the Zoological Society,' 1834) states that the female goes from 17 to 18 months with young, and produces one at a birth: he adds also, "It is believed that the animal lives for 100 years: one taken mature was kept at Katmandoo for 35 years without exhibiting any symptoms of approaching decline. The young continues to suck for nearly two years: it has for a month after birth a pink suffusion over the dark colour proper to the mature hide." The female is desperate in the protection of her young.

382.—THE JAVANESE RHINOCEROS

(*Rh. Javanus*). As far as is ascertained, this species is confined to the island of Java, where it is called Warak. In the character of the incisor teeth, and the horn being single, it agrees with the Indian species; but it is a less bulky animal, and in proportion, more elevated in the limbs; the folds of the skin are both less numerous, less deep, and also differently arranged; the surface of the skin is divided into small polygonal tubercles with a slight central depression in each, from which arise a few short bristly hairs. In its habits this species is gregarious; its range on the island extends from the level of the ocean to the summits of mountains of considerable elevation—the latter situations are preferred; its retreats in these mountains are to be discovered by deeply-excavated passages worked out on their declivities. When met with, or otherwise disturbed, it quietly retires, being very mild and peaceable. Night is the principal season of its activity, and it often commits considerable damage in the plantations of coffee and pepper. The horns and skin are employed for medicinal purposes by the natives. Dr. Horsfield ('Zoological Researches in Java') gives a detailed account of one of these animals which was kept at Surakarta, and which was very mild and tractable, allowing persons even to mount on its back. In its habit of wallowing in the mire it resembled the rest of the genus. The Javanese Rhinoceros was known to Bontius, who wrote on the productions of that island in 1629. Fig. 384 represents the skull of this species, which is more elongated in proportion and less heavily made than that of the Indian animal.

383.—THE SUMATRAN RHINOCEROS

(*Rh. Sumatranus*, Raffles) was first described by Mr Bell, surgeon in the service of the East India Company, at Bencoolen ('Philosophical Transactions, 1793); but it appears to have been indicated previously by Mr. C. Miller, long resident in Sumatra (Pennant's 'History of Quadrupeds,' 3rd ed., vol. i.). The head is more elongated than in the other two species, and there are two horns on the nose: the neck is thick and short, the limbs massive; the skin is rough and black, and covered with short hair; the folds are very inconsiderable, but are most distinct on the neck, shoulders, and haunches. The female is stated to have a heavier head than the male. The number of incisors is four in each jaw, but of these the lateral ones are very small and soon fall out; hence Bell and others supposed the number to be only two.

The Sumatran rhinoceros is by no means bold or savage; one of the largest size has been seen to run away from a single wild dog. Its native name is Badak, whence the term Abadia, or Abath, applied to the Indian rhinoceros by our early navigators. Sir S. Raffles says that, besides this species, there is another animal in the forests of Sumatra, never noticed, which in size and character nearly resembles this rhinoceros, but which is said to have a single horn, and to be distinguished by a narrow white belt encircling the body. The natives of the interior term it Tennu, which, at Malacca, is the name of the Tapir; but in Sumatra the name of the Tapir is Gindol and Babialu. In the interior, however, where different tribes shut out from general communication speak different dialects, it is probable that the term Tennu may be the name applied by some, as at Malacca, to the tapir, and hence would the confusion arise; for, from the description, notwithstanding the assertion that it possesses a horn, we cannot help regarding this Tennu of the forest of the interior as the tapir.

Of the African species of rhinoceros we may first notice the

377, 387.—BLACK OR COMMON AFRICAN RHINOCEROS (*Rh. bicornis*, Linn.; *Rh. Africanus*, Cuv.). This huge animal, though driven from the precincts of

---

* A pair of horns brought by Salt from Abyssinia, and now in the museum of the Royal College of Surgeons, more nearly resemble those of the Keitloa than of the R. bicornis; and Dr. Smith considers a pair brought by Major Denham from North Africa to be different again, and unlike those of any other species. Clubs of rhinoceros-horn, of about three feet in length, have been brought from Dahomey, Western Africa. It is evident that there are two or three species in Africa with which naturalists are not acquainted.

the colony, is still extensively spread throughout the southern regions of Africa. When the Dutch first formed their settlement on the shores of Table Bay, this rhinoceros was a regular inhabitant of the thickets which clothed the lower slopes of the mountain; but it has retired, and, continues to retire, before the advance of colonization and the gun of the hunter. This species differs from the Indian, not only in the possession of a double horn, but in the absence of massive folds of skin, and in wanting the incisor teeth. The skin is thick, coarse, scabrous, and forms a deep furrow round the short thick neck; the head is heavy; the eyes are small, and the skin round them, and on the muzzle, and before the ears, is wrinkled; the upper lip is slightly produced, and prehensile. The anterior horn is long, fibrous at the base, hard, and finely polished at the point; the posterior horn is short and conical. General colour yellowish brown, with tints of purple upon the sides of the head and muzzle; eyes dark brown. Length about eleven feet. A few black hairs fringe the edge of the ears and the tip of the tail. This animal feeds upon brushwood, and the smaller branches of dwarf trees, "from which circumstance," says Dr. Smith, "it is invariably found frequenting wooded districts, and in those situations its course may be often traced by the mutilations of the bushes. The mass of vegetable matter consumed does not appear to be in proportion to the bulk of the animal: indeed, as it feeds but slowly, and passes much of its time in idleness, it must be regarded as a very moderate eater, and, considering that it appears to be fastidious in the choice of its food, it is fortunate for its comfort that it does not require more nourishment." Of the senses of the rhinoceros, those of hearing and smell are very acute, and aid the animal more than his sight in the discovery of danger, the bulk of the body screening objects not immediately before the eyes. "As these animals depend much upon smell for their existence and safety, it is necessary to advance upon them from the leeward side, if the aim be to get close without being discovered. In pursuit they also trust for guidance to the same sense, and may be heard forcibly inspiring the air, when they have lost the scent of the object they are following. The ticks and other insects with which they are covered furnish for them another source of intelligence, inasmuch as they attract a number of birds, which sit quietly picking them off, when nothing strange is in sight, but fly away when any object excites their fear. So well does the rhinoceros understand this, that he proceeds feeding with the greatest confidence while the birds continue perched upon his back; but the moment they fly, the huge animal raises his head and turns it in all directions to catch the scent. Whether he accomplishes this or not, he generally feels so uncertain of his position, that he moves to some other locality." The same observations apply to the other African species. When disturbed or attacked, the rhinoceros becomes furious, and especially when wounded: he then rushes towards his foe, and if he can get the hunter once within his sight, the escape of the latter, unless he exert great presence of mind, or the well-directed shot of a companion stop the animal in his career, is very doubtful. The best plan is to wait till the enraged beast approaches, and then step aside suddenly, where some bush or inequality of the ground may afford a shelter, and give time to the hunter for reloading his gun before the rhinoceros gets sight of him again, which fortunately it does slowly and with difficulty. Travellers in the regions frequented by this animal are not safe during the night from its attacks. It appears to be excited by the glow of a fire, towards which it rushes with fury, overturning every obstacle. It has, indeed, been known to rush with such rapidity upon a military party lodged among the bush covering the banks of the Great Fish River, that before the men could be aroused it had severely injured two of them, tossed about and broken several guns, and completely scattered the burning wood. Le Vaillant, in an animated account of a rhinoceros hunt, describes the enraged and wounded animals as ploughing up the ground with their horns, and throwing a shower of pebbles and stones around them: and Dr. Smith says that they are sometimes seen to plough up the earth for several paces with the front horn when not enraged, but for what object he could not discover. The native (Bechuana) name of this species is Borili.

379, 386.—The Keitloa

(*Rh. Keitloa*, Smith). **In general figure this savage species resembles most nearly the common African rhinoceros. There are, however, he observes, many marked differences between them, of which the following are a few of the external and more palpable. In Rhinoceros Keitloa the two horns are of equal or nearly equal length; in Rhinoceros Africanus the posterior in neither sex is ever much beyond a third of the length of the anterior horn; the length of the head in proportion to the depth is very different in the two. The neck of Rhinoceros Keitloa is much longer than that of the other, and the position and character of the cuticular furrows destined to facilitate the lateral motions of the head are very different.** Besides these, Dr. Smith states that many other diagnostic characters might be instanced; such as the black mark on the inside of the thigh of the Keitloa, the distinctly produced tip of the upper lip, and the comparatively few wrinkles on the snout and parts around the eyes.

The first example of this animal which Dr. Smith met with, during his expedition, was shot about 180 miles N.E. of Lattakoo, but considerably south of the country to which the species appears directly to belong, and from which it might be considered as a wanderer. On the expedition penetrating to the northward of Kurrichane, every one was found conversant with the name and able to direct to situations where the animal was found. Few mentioned the Keitloa without alluding to its vindictive temper and ferocity; and those, says Dr. Smith, who had sufficient confidence in the party, compared to it a chief, then awfully oppressing that part of the country, and spoke of the man and the animal as alike to be feared. As the party advanced, the Keitloa became more common, though it never occurred in such numbers as the other two species.

"The interest," says Dr. Smith, "which the discovery of this species excited, led to the making of minute inquiries as to the animals of this genus; and the expedition had sufficient reason to believe, from the replies to constant questions, that two other undescribed species existed farther in the interior, one of which was described as being something like the Keitloa, and having two horns—the other as differing in many respects, and having only *one* horn. The Keitloa browses on shrubs and the slender branches of brushwood, using the upper lip as an organ of prehension."

388, 389.—The White or Blunt-nosed Rhinoceros

(*Rh. simus*), termed Mohoohoo by the Bechuanas, is larger than the two former species, being upwards of twelve feet in length, and nearly six feet in height. It is a huge, massive animal, with the neck longer than in the other African species, having three deep wrinkles running from the nape down the sides; the muzzle is truncate, the mouth shaped like that of an ox, the upper lip perfectly square, and destitute of the mobility and power of protrusion which it exhibits in the other species. Hence, instead of browsing upon shrubs, it feeds principally upon grass, and therefore frequents open plains where such herbage abounds, wandering very extensively in search of pasturage. This animal was first described by Mr. Burchell, who when at Lattakoo found it in abundance there, and Mr. Campbell brought the head of one to England. In the Mohoohoo the horns are situated close to the extremity of the nose: the first is very long, tapered to a point, and slightly curved back; the second is short, conical, and obtuse. The general colour is pale broccoli-brown; the buttocks, shoulders, and under parts shaded with brownish purple; tail clothed with stiff black hair. According to Dr. Smith, the introduction of fire-arms among the Bechuanas has rendered this animal rare in the district where Mr. Burchell found it numerous: higher up the country, however, it still maintains its ground. In disposition it differs from the other two species, being much more gentle, and is therefore regarded with less fear than either the Keitloa or the Borili.

The flesh of all three species is esteemed wholesome food by the natives, who dig pit-falls for them in situations to which they are known to resort; and sometimes, though rarely with success, attempt to kill them with the assagai or spear. In style of motion they are all alike, and so awkward that their swiftness is to be appreciated not by directly watching the animal itself, but by fixing the eye upon some two points between which it takes its course. To revert to the one-horned rhinoceros, of which Dr. Smith heard in the interior of South Africa, and of which Bruce and Burckhardt received accounts as existing in Adel and the country south of Sennaar, it may be added that Dr. Smith adduces the testimony of Mr. Freeman respecting an animal by no means rare in Makooa, north of the Mosambique Channel, which, overlooking the absurdities and exaggeration of the description, he suspects to be a one-horned rhinoceros, and probably that of which he heard, and which may extend to the countries mentioned by Bruce and Burckhardt.

Among the fossil relics of animals which at some former period have tenanted this globe, and after a quiet possession, generation succeeding generation, of their pasture-lands, have become as it were blotted out of the book of creation, those of the rhinoceros are extremely abundant, little less so, if at all, than those of the fossil elephant or mammoth, as widely distributed and occurring in the same strata and the same localities. Several species have been distinctly made out, among which the most remarkable is that with a bony partition between the nostrils, and supporting the nasal bones; it is termed by Cuvier Rh. tichorhinus. Fig. 390 represents the skull in two views: *a*, profile; *b*, seen from below.

It was of this species that Pallas in 1771 discovered an entire frozen carcass buried in the sand on the banks of the Wilouji or Viloui, which joins the Lena, in Siberia. Happily, therefore, we know the form and true proportions of the living animal. The skin was smooth and destitute of folds, and, like the common African rhinoceros, the animal had two horns. The feet had three toes, as in all extant species, but the hoofs were lost. Like the mammoth of Siberia, this animal was originally covered with hair: in many parts of the skin this hair still remained, especially over the feet, where it was very abundant, measuring from one to three inches in length, of a stiff quality, and of a dusky grey. The head was invested with a similar clothing. The head and feet are preserved in their natural state in the museum of St. Petersburg.

The skull of this species differs from that of the two-horned African rhinoceros, not only in the presence of the osseous nasal partition, but in general form and proportions. The length and narrowness of the skull are very remarkable, as is also the space between the orbits, which is much more contracted than in the common two-horned species, and the nasal bones are far more elongated. In the two-horned rhinoceros the disc which bears the anterior horn is a semi-sphere, in this an oblong ellipse, and a disc of similar figure supports the second horn, whence it may be safely concluded that the horns of this fossil species were strongly compressed at the sides. The occipital ridge is elevated and drawn out backwards, so that from the highest point the occipital bone slopes at a very acute angle inwards to the condyles.

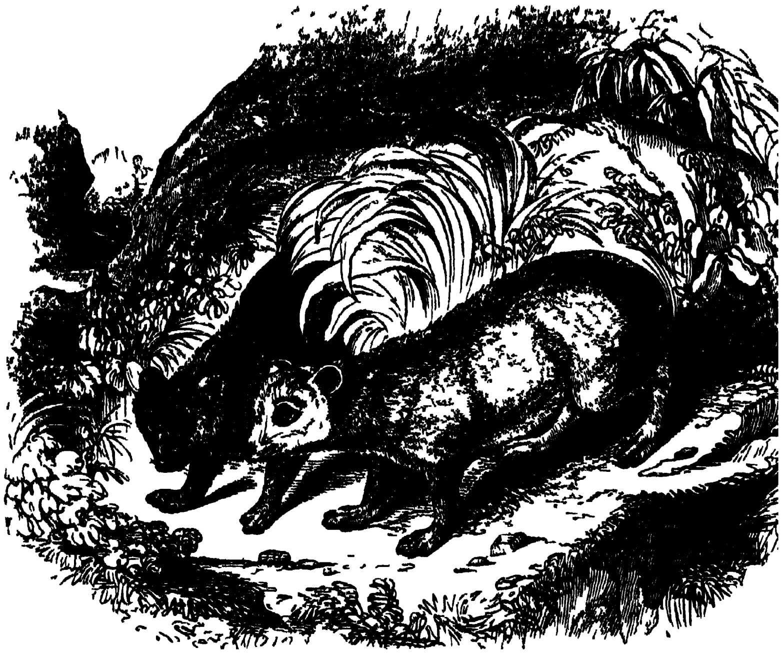
About nine fossil species of rhinoceros are described. Almost every bone-cavern in England, France, and Germany has afforded them in abundance; and Dr. Buckland proves that there must have been a long succession of years in which the elephant, hippopotamus, and rhinoceros, with the hyæna, inhabited our island; and that the former, as the bones testify, became the prey of the latter, or were devoured after natural or accidental death.

391, 392, 393.—The Daman, or Hyrax.

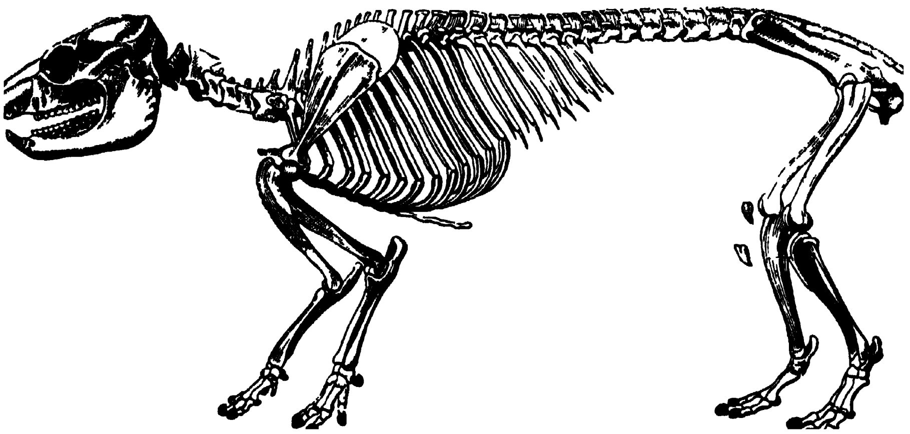
When we look at the rabbit-like hyrax, it does not surprise us to find that all the older naturalists regarded it as a Rodent, and placed it in that order. It was reserved for Cuvier to point out its true situation. "There is no quadruped," says this great man, "which proves more forcibly than the daman the necessity of having recourse to anatomy, as a test by which to determine the true relationship of animals." This fur-covered active creature is a true Pachydermatous animal, and, notwithstanding the smallness of its size, it is to be regarded as "intermediate between the rhinoceros and tapir." The resemblance which the hyrax bears to the former may be traced in its osseous system and internal anatomy (see 'Proceeds. Zool. Soc.' 1832 and 1835). On these points it would here be out of place to dwell; we have, however, figured the skeleton (Fig. 394) and the skull (Fig. 395), which to many will be of interest. With respect to the latter, the singular depth of the lower jaw cannot but strike every attentive observer; and it may be added that in the convexity of the posterior edge of the ascending portion it surpasses that even of the tapir, which, in this respect, is the nearest among all animals to the hyrax. In other particulars the skull approaches that of the rhinoceros; the molar teeth, in fact, are those of the rhinoceros in miniature, both as to form and number. There are, as in the rhinoceros, no canines. The upper incisors, two in number, are long, triangular, pointed, stout, and separated from each other by a small interval. The lower incisors are four in number, set in close array, flat, and directed forwards. At first their edges are notched, but they become smooth by use The molars are seven on each side, above and below: but the first, which is small, falls out, being worn down as soon as the last molar on each side has arisen; and, in old individuals, the next is frequently wanting also.

With respect to the skeleton, it may be remarked that there are 21 ribs on each side, a number greater than in any other quadruped, except the two-toed sloth, which has 23. The elephant and tapir follow the hyrax. The fore-feet are divided into four toes, tipped with hoof-like nails; the hind-feet into three, of which the innermost is furnished with a long claw-like nail. The toes are all buried in the skin, as far as the little hoofs, precisely as in the rhinoceros.

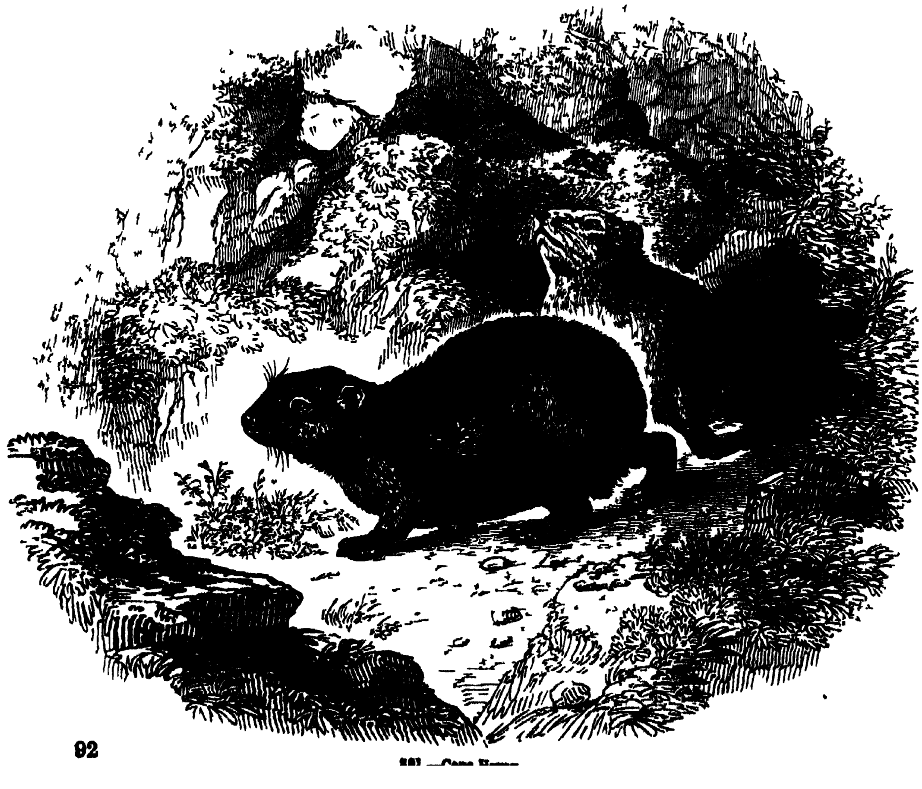
Several species belong to the present genus: we have figured the Cape Hyrax or Daman (Fig. 391)



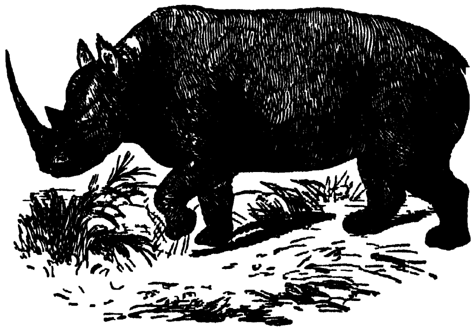
393.—Syrian Hyrax.



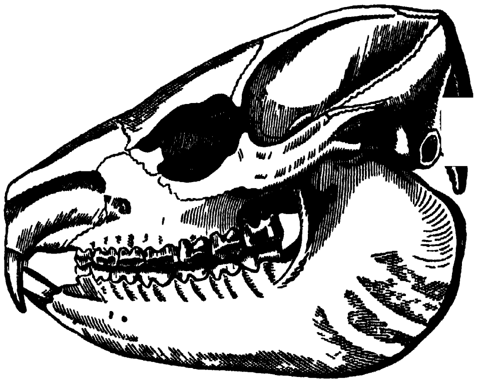
394.—Skeleton of Daman.



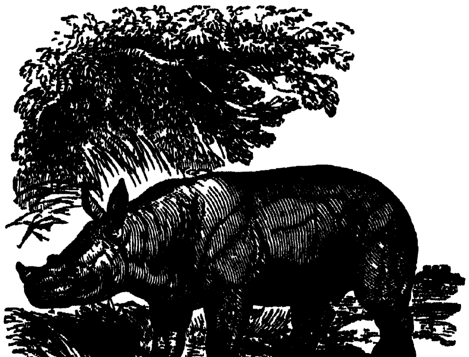
391.—Cape Hyrax.



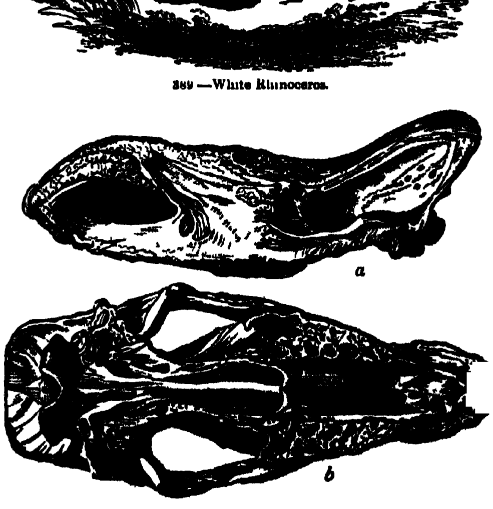
388.—Two horned Rhinoceros.



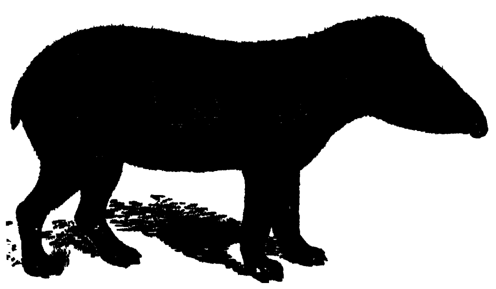
395.—Skull of Daman.



389.—White Rhinoceros.

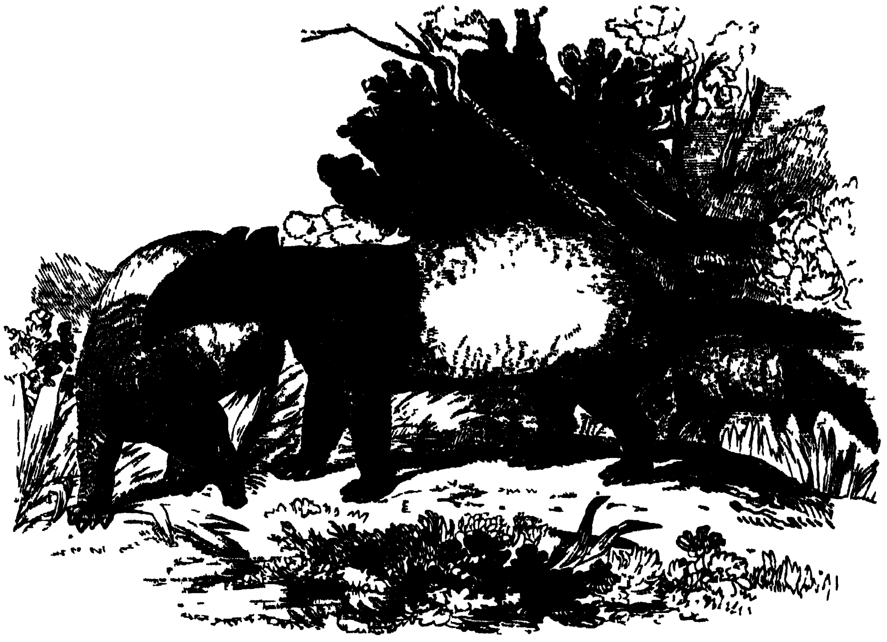


390.—Skull of Fossil Rhinoceros.

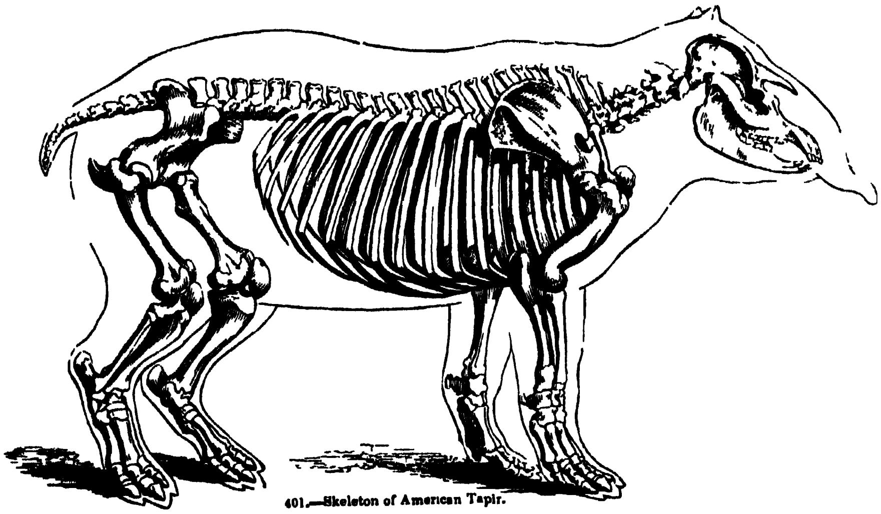


399.—American Tapir

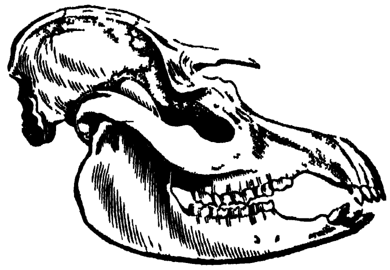
400.—Young Tapir.



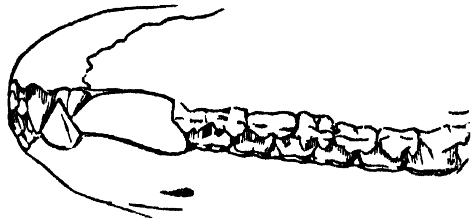
396.—Indian or Malay Tapir.



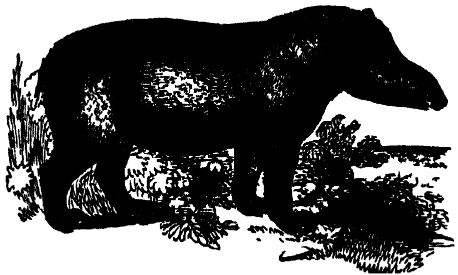
401.—Skeleton of American Tapir.



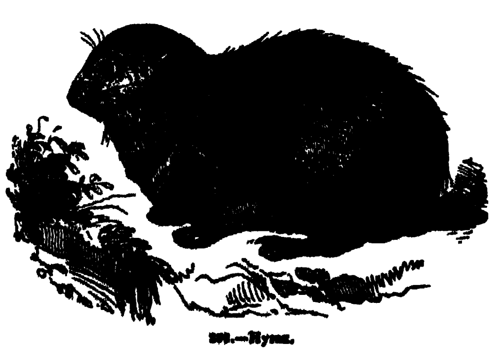
402.—Skull of American Tapir.



403.—Teeth of Sumatran Tapir



398.—American Tapir.



[illegible].—Hyrax.

397.—Indian Tapir.

and the Syrian Hyrax, or Coney of the Scriptures (Fig. 393).

391.—The Cape Hyrax, or Dassie of the Colonists

(*Hyrax Capensis*), is common in the rocky and mountain districts of South Africa, taking up its abode in the fissures of the rugged crags, which afford it an asylum. It abounds on the sides of Table Mountain, but is so wary, quick, and active, that it is not to be approached without much difficulty. It often, however, falls a prey to the eagle and falcon, which pounce upon it while feeding in apparent security. The Vulturine Eagle (Aquila Vulturina), which makes the mountain precipices its abode, destroys it in great numbers. This timid little animal is gregarious in its habits, like the rabbit, which it somewhat exceeds in size. The fur is soft and deep, and of a dark greyish brown, becoming of a paler tint beneath. There is no tail. The following communication, by Mr. W. R. Read (see 'Proceedings of the Zoological Society,' 1835, p. 13), needs no apology for its insertion:—

"The Hyrax Capensis is found inhabiting the hollows and crevices of rocks, both on the summits and sides of hills, as well as near the sea-shore, even a little above high-water mark. It appears to live in families, and is remarkably shy in its wild state. In winter it is fond of coming out of its hole, and sunning itself on the lee side of a rock, and in summer of enjoying the breeze on the top; but in both instances, as well as when it feeds, a sentinel is on the look out (generally an old male), which gives notice, usually by a shrill prolonged cry, of the approach of danger, or even the least movement of any suspicious object. It lives on the young shoots of shrubs, the tops of flowers, herbs and grass, particularly of all those which are aromatic."

393.—The Syrian Hyrax

(*H. Syriacus*). This species, according to Bruce, is found in Abyssinia, where it haunts the deep caverns and clefts in the rocks. By the natives of Amhara it is termed Ashkoko, or Askoko. It also tenants the mountains of Syria and Arabia; and, as in days of old, the rocks of Horeb and of Sinai are still "a refuge for the Coneys." By the Arabs, according to Dr. Shaw, it is called Daman Israel, that is, Lamb of Israel, or rather Ganam or Gannim Israël, as Bruce contends, the word Daman being mistaken for the latter. Most authorities agree that it is the Shaphan (translated Coney) of the Scriptures. The Syrian Hyrax agrees in habits with its Cape relative. It tenants the acclivities of the rocks, sheltering itself under projecting ledges, in deep fissures and caves: it is gregarious, and dozens may be often seen either sitting upon the great stones at the mouth of the caves, to warm themselves in the sun, or playfully skipping about in the enjoyment of the freshness of the evening. When captured, they inflict severe wounds with their formidable incisors, but are soon rendered tame and familiar. Cuvier and many naturalists have hesitated as to the distinctness of the Syrian and the Cape Hyrax. They are, as we think, undoubtedly different, and the Syrian species may be distinguished by the presence of long bristle-like, but slender, black hairs, dispersed not very thinly over its body and considerably exceeding the fur: such at least was the case with the specimen which we examined; while in the numerous specimens from the Cape, of all ages, in the museum of the Zoological Society, nothing of the kind is to be perceived. Bruce, indeed, noticed this peculiarity, and he considered the Amharic name Ashkoko "as derived from the singularity of those long herinaceous hairs which, like small thorns, grow about his back, and which in Amhara are called Ashok."

A fossil form closely allied to the Hyrax, the skull of which has been discovered in the clay near Herne Bay, has been described by Professor Owen.

Genus *Tapirus*.—This genus comprehends, as far as known, only three species, of which two are natives of South America, the other of Sumatra and Malacca.

The geographical distribution of the existing species of pachydermatous animals is so partial, that we are surprised to find the islands of Sumatra and the peninsula of Malacca dividing with South America this limited genus between them. America, compared with Asia and Africa, is deficient in living forms of the Pachydermata: two only are indigenous to that vast continent, viz., the peccary and tapir; and, reasoning from analogy, we should not expect to find either of these forms in any portion of the Old World, and more especially in the islands of the Indian Archipelago. The great mass of the Pachydermata are peculiar to the warmer regions of Asia and the continent of Africa; and many genera, as Elephas, Rhinoceros, Sus, and Equus, give species to each, but not to America: so that the existence of cognate species in one of the Indian Islands and in South America appears as if it were an exception to a general rule, at least if we limit our views to the races now extant on the earth. Once, indeed, America was replete with animals of this order: and why so few should now appear as their representatives is a point not easy of solution. In their general form and contour the tapirs remind us of the hog; but the snout consists of a flexible proboscis, not, indeed, elongated like that of the elephant, but still sufficiently developed to serve as a hook by which the animal is capable of drawing down twigs to the mouth, of grasping fruit or bunches of herbage. The nostrils open at its extremity in the form of two transverse fissures, but there is no finger-like appendage. (For anatomy see 'Proceed. Zool. Soc.,' 1830, p. 163.)

The tapir is a massive, powerful animal; the limbs are thick and moderately long; the head is large, compressed, and, in the American species, elevated at the occiput (see Fig. 402), whence the thick neck rises with a prominent upper crest or ridge, along which runs a mane of stiff thinly-set hairs. The eyes are small and deep set; the ears are rather short; the tail is rudimentary. The anterior feet are divided into four toes, the hinder into three, the tips only being cased in hoofs. The skin, which is thick, tough, and solid, is sparely covered, excepting in one species, with very short close hair. The dentition (see Fig. 403) consists of six incisors in each jaw; the canines are small, especially those of the upper jaw, and are separated from the molars by a considerable interval; the molars are seven on each side above, and six below, and, until worn down by attrition, the crowns present two transverse ridges. Fig. 401 represents the skeleton of the ordinary American Tapir; in general details it approaches that of the rhinoceros. Of the two species of tapir peculiar to America, one has been only recently discovered. It was found by Dr. Roulin in the most elevated regions of the Cordillera of the Andes, and is covered with long, thick, black hair. The bones of the nose are more elongated than in the other species, and Cuvier regards it as approaching in some respects to the fossil genus Palæotherium.

398, 399.—The Common American Tapir

(*Tapirus Americanus*). This species is very extensively spread throughout the warmer regions of South America, but especially between the tropics, where it inhabits the deep forests, leading a solitary life, and seldom stirring from its retreat during the day, which it passes in a state of tranquil slumber. During the night, its season of activity, it wanders forth in quest of food, which consists of water-melons, gourds, young shoots of brushwood, &c. Its choice of food is not very limited; and indeed, it appears to be as omnivorous as the hog. Azara, who states that the Guaranis term this animal Mborebi, and the Portuguese of Brazil, Anta, affirms that it devours the barreiro, or nitrous earth of Paraguay, and that he has found a quantity of this substance in the stomach. Its senses of smell and hearing are extremely acute, and serve to give notice of the approach of enemies. Its voice, which it seldom utters, is a shrill kind of whistle, in strange contrast with the massive bulk of the animal. Of enormous muscular power, and defended with a tough, thick hide, the tapir is capable of tearing its way through the underwood in whatsoever direction it pleases: when thus driving onwards, it carries its head low, and, as it were, ploughs its course.

Its fondness for the water is almost as strong as that evinced by the hippopotamus. It swims and dives admirably, and will remain, as we have seen while observing the specimens in the gardens of the Zool. Soc., submerged for many minutes, rise to the surface for breath, and plunge again. When hunted or wounded it always, if possible, makes for the water, and in its nightly wanderings will traverse rivers and lakes in search of food, or for pleasure. The female is very attentive to her young one, leading it about on the land, and accustoming it at an early period to enter the water, where it plunges and plays before its parent, who seems to act as its instructress. The male takes no share in this work, and does not constantly associate with the female.

In its disposition the tapir is peaceful and quiet, and, unless hard pressed, never attempts to attack either man or beast; when, however, the hunter's dogs surround it, it defends itself very vigorously with its teeth, inflicting terrible wounds. We have witnessed those in confinement in the gardens of the Zool. Soc. occasionally break out into fits of irritation, plunging about, lunging violently with their heads, and snapping with their teeth like a hog. The most formidable enemy of this animal (if we except man) is the jaguar; and it is asserted that when that tiger of the American forest throws itself upon the tapir, the latter rushes through the most dense and tangled underwood, bruising its enemy, and endeavouring thus to dislodge him, and sometimes succeeds in the attempt.

In Cayenne the Tapir is occasionally domesticated, and is harmless and quiet: it becomes indeed familiar, and often proves troublesome to those who caress it, as may be imagined would be the case with a pet hog under similar circumstances. The adult Tapir measures from 5 to 6 feet in length, and between three and four in height; its colour is uniform deep blackish brown; the young are longitudinally marked with spots and six or eight bands of fawn-colour along the body, and with numerous spots of the same tint on the cheeks. (See Fig. 400.)

396, 397.—The Malay or Indian Tapir

(*Tapirus Indicus*, Farquhar). This species was first introduced to science by Major Farquhar in 1816. It is a native of Sumatra and the Malay Peninsula, where it is called *tannoh* or *tennu*; and is as well known in Malacca as the elephant or rhinoceros. In disposition it resembles its American relative. It feeds on vegetables, and is very partial to the sugar-cane. Though the natives have not domesticated it, this species is as easily tamed as the Tapir of America, and becomes as gentle and familiar. Major Farquhar possessed one which was completely domesticated, and as much at home as any of the dogs: it fed indiscriminately on all kinds of vegetables, and was very fond of attending at table to receive bread, cakes, and the like. This Tapir was procured in the Malay Peninsula. (See 'Trans. Asiat. Soc.,' vol. xv., 1820.) A Sumatran tapir was about the same time presented alive to the Asiatic Society by G. J. Siddons, Esq., resident at Bencoolen. It was of a lazy habit, very familiar, and delighted in being rubbed or scratched; and this favour it solicited from the people about him, by throwing itself down on its side, and making sundry movements. It is distinctly stated of this Sumatran specimen, that another of its great delights was to bathe,—also "that it remained a very considerable time under water." The living specimen, says Sir S. Raffles, sent from Bencoolen to Bengal, "was allowed to roam occasionally in the park at Barrackpore. The man who had the charge of it informed me that it frequently entered the pond, and appeared to walk along the bottom under the water, and not make any attempt to swim." This characteristic habit of the animal was not observed by Major Farquhar in his Malacca specimen. That gentleman says, indeed, that he thought he might venture to affirm that the Malacca tapir is not, like the American species, amphibious in its nature. He adds, that the one he reared showed rather an antipathy to water, and that in the peninsula of Malacca these animals are found to frequent high grounds. As, however, it is admitted on all sides that the Malacca and the Sumatran tapirs are the same, and as these creatures differ in no material points of conformation from the American tapir, it is not easy to imagine that, while the American animal and that from Sumatra are so aquatic in their habits, the animal from Malacca should exhibit contrary propensities. In Sumatra the tapir inhabits the dense forests of the interior, and is, therefore, seldom seen: hence it has been considered rare in that island: it must, however, be observed, that after the loss of the ship Fame by fire, when a living Sumatran tapir with other animals perished, Sir S. Raffles, during the short period of his stay in Sumatra, was enabled to procure other specimens, one of which is in the museum of the Zoological Society, and another in the museum of the East India Company.

The Indian tapir exceeds the American in size: it has no mane, and the snout is longer and more proboscis-like. The most striking external difference between the eastern and western animal, however, is in colour. Instead of being of the uniform dusky-bay tint of the American, the Indian tapir is strangely parti-coloured. The head, neck, fore-limbs, and fore-quarters are quite black: the body then becomes suddenly white or greyish-white, and so continues to about half way over the hind-quarters, when the black again commences abruptly, and is spread over the legs. The abruptness and contrast of the marking of this animal makes it look precisely as if it were covered round the body with a white horse-cloth, leaving the fore and hind-quarters exposed. The young, until the age of four months, are black, beautifully marked with spots and stripes of fawn colour above, and white below.

According to Sir S. Raffles, the Indian tapir receives various names in different districts. By the people of Limun it is called Saladang; in the interior of Manna, Gindol; at Bencoolen, Babi Ala; and at Malacca, Tennu. Marsden states that it is denominated by the Malays in many districts Kuda-ayer, or river-horse. Though the flesh of the Indian Tapir, like that of the American, is dry and disagreeable, and therefore of little value as an article of food, still the animal might be domesticated with advantage (and the same observation applies to the western species), and employed as a beast of draught or burden, its docility and great strength being strong recommendations. Its skin would prove from its toughness, useful for various purposes.

404, 405.—The Palæotherium.

In the gypsum-quarries near Paris and in various parts of France have been discovered the fossil relics of a group of Pachydermatous animals, to which Cuvier gave the title of Palæotherium. Ten or eleven species are recognised, varying from the size of a rhinoceros to that of a hog. The most immediate alliance of these fossil forms is to the Tapir, and they, perhaps, take an intermediate station between that animal and the rhinoceros. The bones of the nose prove that the Palæotheria must have been furnished with a short proboscis; the toes were three in number on each foot: the dentition consisted of 6 incisors in each jaw; canines, as usual; and 7 molars on each side above and below.

Figs. 404 and 405 represent respectively outlines of the Palæotherium magnum and Palæotherium minus, as restored by Cuvier; Figs. 406 and 407 represent the skeletons of the same animals; Fig. 408 is an imperfect skull of Palæotherium magnum; Fig. 409 shows the characters of the molar teeth of the upper jaw; Fig. 410, the lower jaw and molar teeth, imperfect.

The restoration of the skeletons of these extinct forms is one of the triumphs of science; and, by persons unacquainted with the law of harmonious dependence which reigns throughout the structure and organization of animal bodies, might be deemed an improbability, or at least, an uncertain process: not so—the bones of the feet, the teeth, the spine, or of the limbs, are to the comparative anatomist a foundation upon which he can rear a superstructure, a clue to the recomposition of the fabric. Speaking of the accumulated stores of fossil relics at his command, Cuvier thus writes:—"I at length found myself, as if placed in a charnel-house, surrounded by mutilated fragments of many hundred skeletons of more than twenty kinds of animals piled confusedly around me; the task assigned to me was to restore them all to their original position. At the voice of comparative anatomy every bone and fragment of a bone resumed its place. I cannot find words to express the pleasure I experienced in seeing, when I discovered one character, how all the consequences which I predicted from it were successively confirmed. The feet accorded with the characters announced by the teeth; the teeth were in harmony with those indicated previously by the feet. The bones of the legs and thighs, and every connecting portion of the extremities, were seen joined together precisely as I had arranged them, before my conjectures were verified by the discovery of the parts entire. Each species was, in short, reconstructed from a single unit of its component elements." The relics of the Palæotheria are found mingled with those of many other extinct forms in a stratum of fresh-water formation, as is evidenced by the shells it contains: it is the first of the great fresh-water formations of the Eocene period of Lyell, a deposit in which nearly fifty extinct species were discovered by Cuvier. We cannot doubt but that, like the tapir and rhinoceros of the present day, the Palæotheria frequented the borders of lakes and large rivers, feeding upon the leaves and twigs of brushwood: there they lived and died; their dead carcasses drifted to the bottom of the lake, swept off from the shore in seasons of flood, when the swollen rivers cleared the adjacent lowlands of hosts of dead, and perhaps also of the living, hurrying them to destruction, and depositing their relics, to be in other ages brought to light, the "reliquiæ vetustioris ævi."

Another fossil genus allied to the tapirs is termed by Cuvier Lophiodon: not less than fifteen species are determined; and they are found in the same fresh-water formation as the Palæotheria. The dentition of the Lophiodon differs from that of the last-named animals, the lower jaw having only six molars. The teeth in character approach those of the rhinoceros. Fig. 411 represents a lower back molar of the gigantic Lophiodon of Argenton; Fig. 412, an upper back molar; Fig. 413, a canine tooth; Fig. 414, two incisor teeth: all of the same species. With many essential parts of the osteology of these extinct animals naturalists are as yet unacquainted; the bones of the nose, for example, and those of the feet, are not recovered. The remains of the Lophiodons found at Issel, Argenton, Bucksweiler, Montpellier, Montabusard, &c., occur in beds of fresh-water formation, but below those superficial strata containing the bones of the Mammoth and Mastodon. They are associated with the relics of forms of terrestrial animals of which we have no living prototypes, and with those of crocodiles and fresh-water tortoises. The antiquity of these beds may be inferred from the fact that in most places they are covered by strata of decidedly marine formation, so that the Lophiodon existed and passed away not only before the races had commenced whose remains are found (and found only) in the alluvial strata of the earth, but before the extinction of still older races: they belong in fact to strata of our continent, over which, after becoming consolidated, the sea has rolled, and remained long enough to cover them with rocks of a new origin.

The Family *Suidæ*, or the Hog tribe.—The animals composing this family, of which the hog is the type, are distributed over Europe, Asia, Africa, and South America; it is indeed the only pachydermatous group the members of which are thus distributed. Viewed externally, the feet of these animals resemble those of the ordinary Ruminants, and may indeed be termed cloven; but the distinction is evident when we come to examine the bones. In the hog every toe (there are four on each foot) has its own metacarpal or metatarsal bone, and though the outer toe on each side is shorter than the two middle, still it is as perfect in conformation. The external similarity of the feet of the hog to those of the cloven-footed ruminants, and their real distinction, did not escape Buffon, though at the same time that celebrated philosopher was unable to discern the true affinities of this animal, and its real place in the scale of the Mammalia. In the peccaries, however, it must be observed that the metacarpal bones of the two middle toes of the fore-limbs and the corresponding metatarsal bones of the hind-limbs are consolidated into a sort of canon-bone, as in ruminating animals, while at the same time the stomach is divided into several distinct sacculi—an additional point of structural approximation to the Ruminants.

The general external characters of the hog tribe need not be recapitulated here; all are familiar with them, as displayed by the ordinary tenant of the sty.

415.—The Collared Peccary

(*Dicotyles torquatus*). The Peccaries are the only indigenous representatives of the porcine group in America; the hog, which is now common there, being of recent introduction, though it wanders in wild herds.

The peccary closely resembles the hog in form and in the quality of the bristly hair which covers the body. It differs, however, from the hog in dentition, the incisors of the upper jaw being four instead of six, and the molars above and below on each side six; while the tusks, which are of moderate size compared with those of the hog, instead of taking a curve outwards, meet like ordinary canines; they are, however, sharp and effective weapons. Fig. 423 represents a lateral view of the teeth of both jaws; Fig. 424 those of the upper jaw in two views, and Fig. 425 those of the under. The limbs are more slender in proportion than in the hog, and there are only three toes on the hinder feet, the small outer toe being wanting. The tail is a mere tubercle: beneath the skin on the top of the loins is a large glandular apparatus, which pours out a secretion of disgusting odour. In their voice, their habits of rooting in the earth, the mode in which when angry they erect the bristles of the mane, and clash their teeth, they resemble their porcine relative of the Old World.

The collared peccary is a native of the dense forests throughout the greater part of South America, and is usually met with in pairs or small families: they take up their abode in hollow trees and holes of the earth, where they seek a refuge from the pursuit of their enemies, of which, man excepted, the jaguar is the most destructive. Plantations of maize, sugar-canes, and potatoes often suffer from their incursions. It is only when hard pressed that the peccary defends itself: indeed it displays nothing of the sullen courage of the wild boar, but retreats on the appearance of danger, and precipitately seeks its hiding-place.

Azara states that the Guarinis term this species Taytétou, and the white-lipped species Tagnicati. It is, he adds, domesticated with more facility than the wild hog, and becomes troublesome from its familiarity. "It is said, and I believe it, that their flesh is good, but not so fat as that of the hog; when killed, however, the glandular orifice between the haunches must be removed, since, if this be not done, the flesh acquires a bad odour and taste. Nevertheless the Indians eat it without this precaution." The inferiority of the flesh of the peccary to that of the hog, and its dorsal gland, will combine to exclude it from the European farmyard. The collared peccary is about three feet in length, and is distinguished by a stripe of white or yellowish white passing from the withers down each shoulder and meeting on the throat. Its general colour is grizzled blackish grey; the bristles being ringed grey, straw-colour, and black.

The white-lipped peccary (*Dicotyles labiatus*) is larger than the collared species and more robust; it associates in vast troops directed by an old male; when attacked they surround the man, dog, or jaguar, and if there be no means of escape, their enemy is soon torn to pieces. M. Schomburgk had a narrow escape from an infuriated herd, the leader of which he shot in the act of rushing at him: as the troop approached where he stood, the noise was like that of a whirlwind through the bushes; "but the peculiar growl and awful clapping of the teeth," he adds, "did not leave me long in doubt as to its cause: it was evident the herd had divided, and were coming directly towards me: I know not yet how I climbed the lower part of a mora-tree, when by they rushed, their muzzles almost sweeping the ground, and their rough bristles on the back standing erect: they might have numbered fifty. They came and passed like a whirlwind; and before I had recovered from my astonishment, I heard them plunge into the river and swim to the opposite bank." Both species delight to wallow in the mire and muddy pools, and readily take to the water, swimming with great vigour.

In captivity the white-lipped peccary has appeared to us to be more reserved and savage than the collared species, and more ready to testify by the clashing of its teeth its feelings of displeasure.

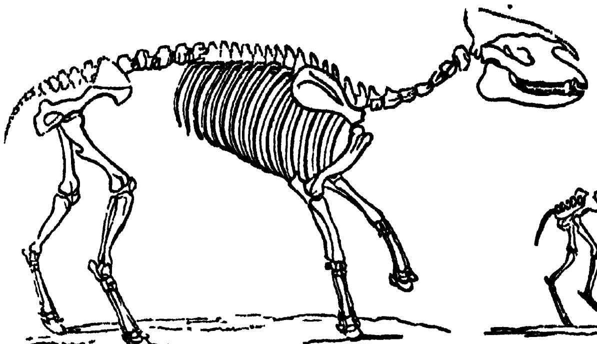
416, 417.—The Babiroussa

(*Sus Babirussa*, Linn.; *Babirussa alfurus*, F. Cuv.). The term Babiroussa means literally hog-deer, and there is some reason to think that the ancients were not altogether unacquainted with the animal. Pliny notices a wild boar with horns on the forehead, found in India; and Cosmes, a writer in the sixth century, uses the term hog-deer (χοιρελαφος) as the designation of an Indian animal: however this may be, it is only recently that naturalists have become well acquainted with it and its habits, though its skulls have been brought over to Europe in abundance by vessels trading among the Moluccas.

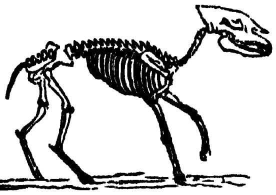
The Babiroussa differs somewhat in dentition from the hog, the incisors being four above, instead of six, and the molars five on each side in either jaw. The upper canines or tusks of the male emerge directly upward from their apparently distorted sockets, and sweep with a bold arch backwards, attaining to a very great length. The skin is thick, coarse, granular, of a blackish tint, and sparingly beset with very short bristly hairs. The tusks of the lower jaw are long, strong, and sharp, emerging like those of the boar. The tusks of the upper jaw do not pass out between the lips, but cut their way through the skin, nearly halfway between the end of the snout and the eyes. The tusks of the lower jaw are formidable weapons. The male when adult equals the largest hog; the female is of much inferior size, and destitute of the curled upper tusks, or has them only rudimentary.

The Babiroussa is found in the marshy forests in the interior of Bourou, and other of the Molucca islands, as Amboyna, and also Java, where it associates in troops. Its habits resemble those of the wild hog, and it is restless and ferocious. According to Lesson it feeds chiefly upon maize, giving preference to that grain beyond other articles of diet. It is partial to the water, and swims with the greatest ease, often crossing the straits between adjacent islands without any difficulty. Some time since a pair of these animals were living and produced young in the menagerie of Paris. They were fond of nestling under the straw, and when the male retired to rest the female would cover him over with litter, and then creep under the straw to him, so that both were concealed. The following are notes which we made from a young male babiroussa living in the gardens of the Zool. Soc.:—This animal is hog-like in its figure, and much resembles a small pig of the Chinese breed. It is roundly formed like a young well-bred hog, and the skin lies close, giving a compactness to its appearance. The head is small, and high between the ears; the snout is elongated; the ears are very small, erect, and pointed; the eyes in their form and expression resemble those of a stag; the iris is brown; the skin, which is thinly clothed with short black bristly hairs, is everywhere dotted with small granulations, which spread and become rougher, coarser, and more decided about the limbs and feet, and especially on the anterior part of the head and sides of the face and under-jaw. Closely as the skin lies, it becomes thrown into a series of regular and prettily arranged wrinkles or furrows with the different movements of the body, and varying in direction accordingly. As the animal turns to one side, these furrows are transverse; in other attitudes they become more or less oblique; but none are to be seen when the animal stands still or lies quietly on its straw. The tail is rather long, slender, and tapering; the limbs are well proportioned, and do not appear to be longer, in relation to the size of the body, than in the hog; the tusks of the upper jaw (in the present individual) are at present small, but curved back.

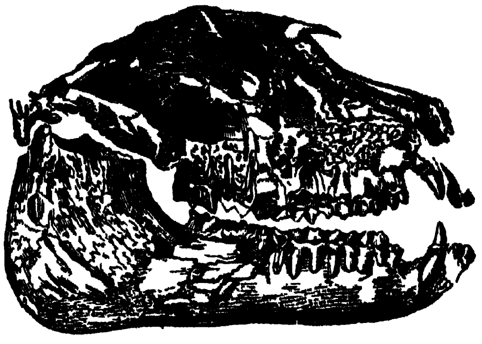
In its state of captivity this young babiroussa seems as contented as a pig in its sty, and it is not only quiet, but disposed to familiarity, raising itself up on its hind-legs, and putting its snout to the bars



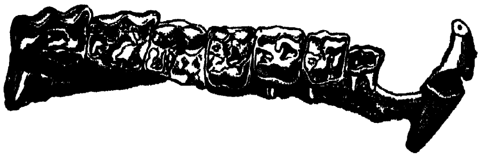
406.—Skeleton of Palæotherium magnum



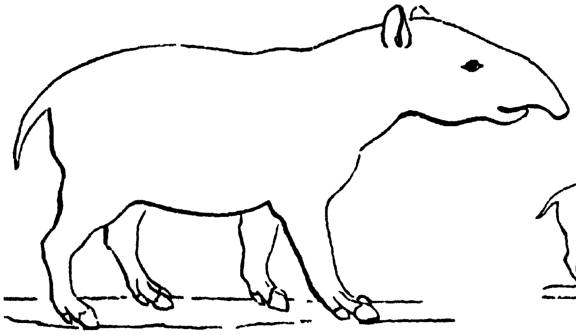
407.—Skeleton of Palæotherium minus



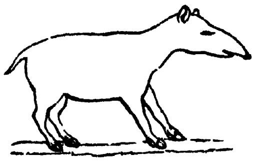
408.—Skull of Palæotherium magnum.



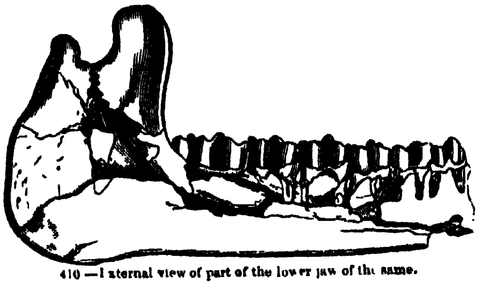
409.—Molar teeth of upper jaw of the same, seen from above.



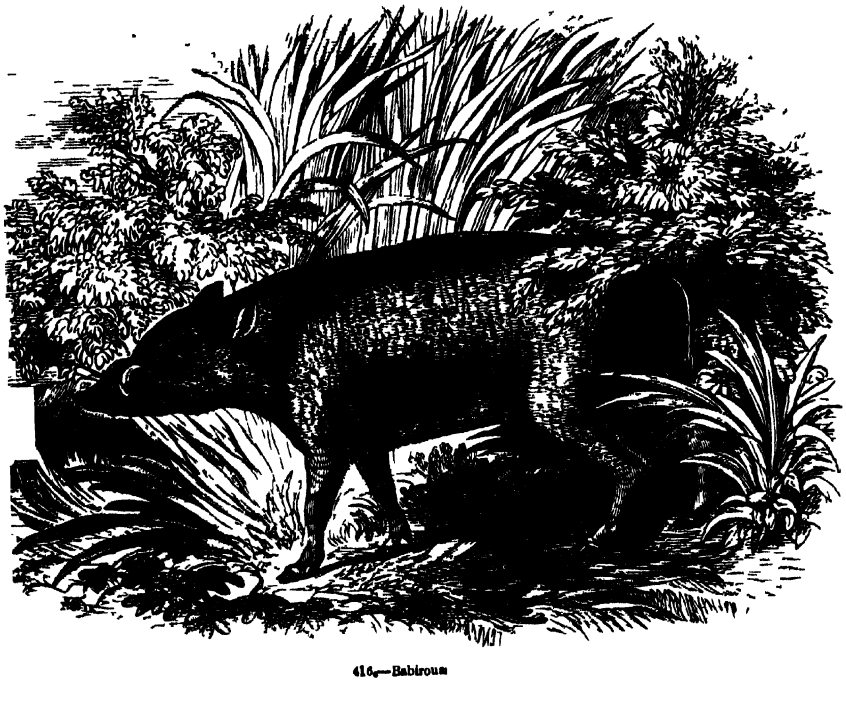
404.—Outline of Palæotherium magnum



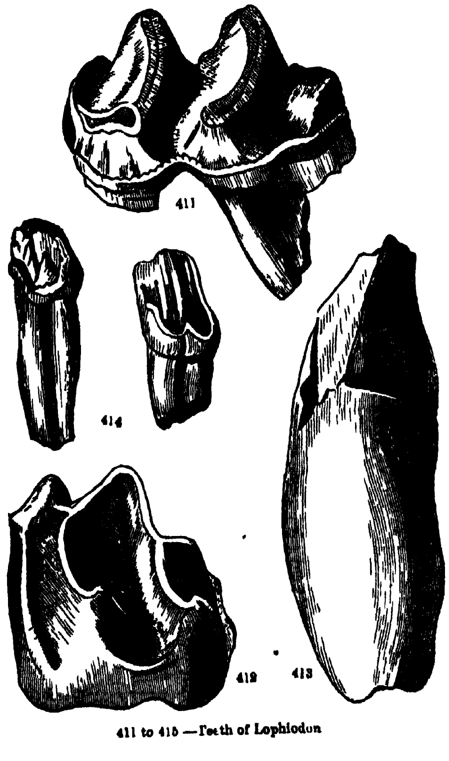
405.—Outline of Palæotherium minus



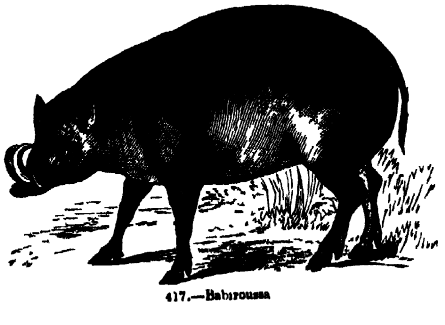
410.—External view of part of the lower jaw of the same.



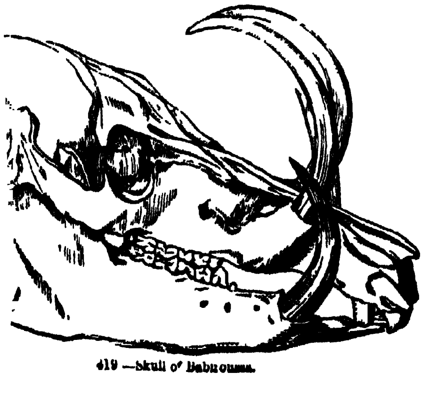
416.—Babiroussa



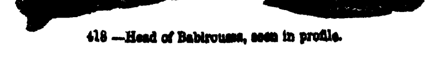
411 to 414.—Teeth of Lophiodon



417.—Babiroussa

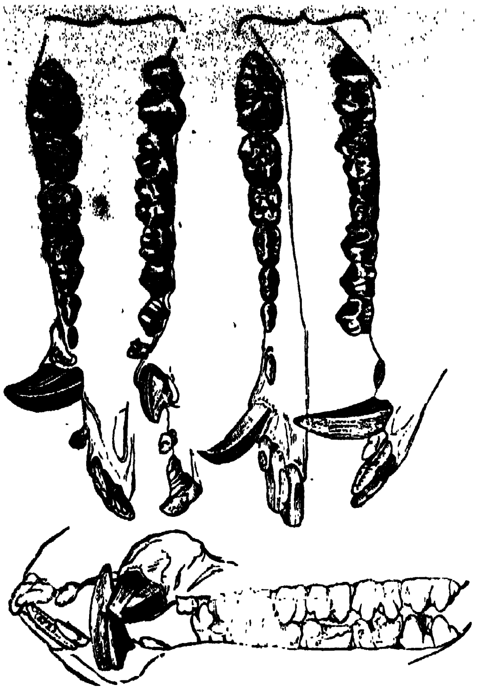


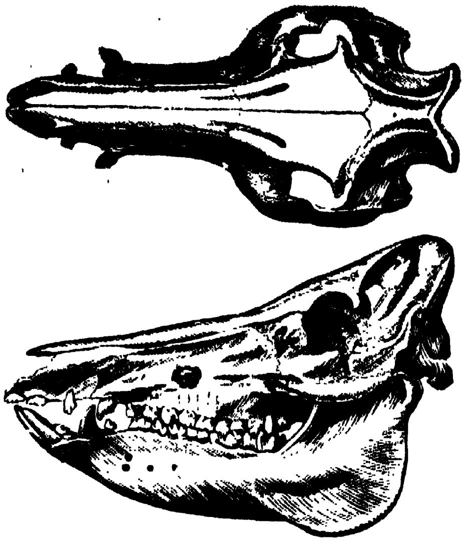
419.—Skull of Babiroussa.

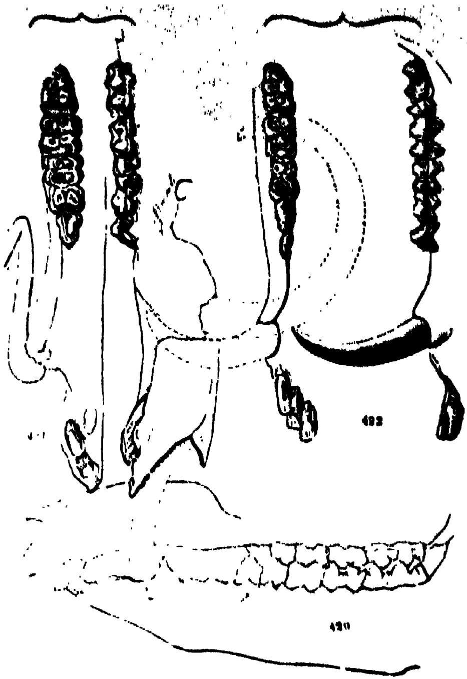


418.—Head of Babiroussa, seen in profile.

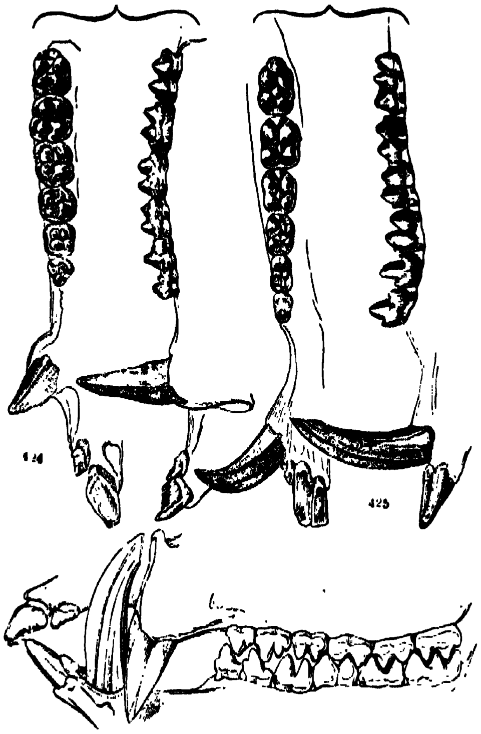
415.—Collared Peccary


430.—Teeth of the Hog.


429.—Skull of the Hog.



420 to 422.—Teeth of Babiroussa.



423 to 425.—Teeth of Collared Peccary.

426.—Wild Boar.

427.—Boar-hunt.

428.—Boar-hunt.

of the enclosure, evidently soliciting food. It turns the straw over and over with its snout, and champs in eating, but utters, as far as we could learn, no grunt, as does the hog, nor has it the unpleasant smell of the latter. That the babiroussa might be reclaimed, notwithstanding Lesson's account of its savage disposition in captivity, and added to our domestic animals, is very evident. Its flesh is reported to be held in high estimation. Fig. 418 represents the head of the male babiroussa (*a*) and of the female (*b*) by way of contrast. Fig. 419 is an admirable delineation of the skull of the adult male, in which the form of the tusks, their relative proportions and direction are faithfully given. Fig. 420, a lateral view of the dentition of upper and lower jaw. Fig. 421, dentition of upper jaw in two views; Fig. 422, those of the lower jaw.

426, 431.—THE WILD HOG

(*Sus Aper*, Briss.; *Sus Scrofa*, Linn.). The wild hog is, as all naturalists admit, the origin of our domestic race, but at what period it was reclaimed is very uncertain. The circumstances indeed connected with the domestication of every animal subject to the bondage of man are enveloped in obscurity. The domestication, however, of the wild hog would not involve much difficulty. Young individuals taken in their native forest soon become reconciled to captivity, and display the same contentment and familiarity which are so conspicuous in the ordinary tame beast. It is this disposition, a characteristic of the Pachydermata, which renders the elephant, the rhinoceros, the tapir, and others, so easily subjugated; but, on the other hand, the readiness with which they submit to the restraints of captivity is counterbalanced by an equal readiness to assume a life of independence. The hog when left to itself resumes its original habits, as is the case in America, where wild herds roam the forest; and, as we have seen, the elephant often escapes its trammels and joins its wild brethren, immediately submitting, if retaken, to the voice of authority which it had previously learned to obey. The horse in a wild state scours the plains of Tartary and South America; it requires but a struggle to break in the most spirited. It may be laid down as an axiom, that the animals of whose services man stands most in need are, each in their way, those whose nature most readily induces them to submit to his dominion, nay, even court his friendship. Some we can tame, and only tame; others we can educate.

The wild hog was once common in our island, and it is almost surprising, considering the passion for the chase which seems to be part and parcel of our English temperament, that this animal is not re-established in some of its old haunts, the parks and forests of nobility. In India, indeed, the chase of the wild boar is one of the field-sports to which our countrymen are enthusiastically devoted; nor is there any reason why it might not be revived in England.

The wild hog is still common in the forests of Germany, France, and other portions of Europe, and extends also through Asia and Africa; if indeed the species is positively identical—a point which there is some reason to question. At all events slight differences are observable between the Indian wild boar and the present breed of the German forests; and Sonnini expresses a doubt as to the identity of the Egyptian and European wild race.

In no essential point does the wild race of Europe differ from our domestic breeds; the snout however is more elongated, and, as might be expected, the contour of the frame is more gaunt and bony. The ears are short and erect, the tusks large, and the bristles long and coarse; the general colour is rusty-black or blackish brown, more or less brindled in patches. After the age of three years, the wild boar leads a solitary life in the forest, fearless of every foe and confident in his weapons, which, added to his great strength, render him a formidable antagonist. It is not, however, until the age of five or six years that he attains to his full dimensions, and the duration of his life is from twenty-five to thirty years. The females with their young associate in herds for the sake of mutual protection: on the approach of an enemy the young are placed in the centre, the old ones forming a circle round them; and should he be hazardous enough to venture on the attack, he meets with a rough reception. It is thus that the young are preserved from wolves, the chief foes to be dreaded by them; to which in some districts they often fall a prey, notwithstanding the vigilance of their parent. It is only in defence of their young that the females are furious, but the old males are not to be approached without caution, and often rush out upon those who venture near the precincts of their lair. At certain seasons, indeed, the wild boar is very savage, and should he meet a rival, the most sanguinary combat ensues.

In the month of December or January, each male attaches himself to the society of a chosen female, whom he accompanies in the deepest glens of the forest for about thirty days. When about to produce her young, the female seeks some undisturbed retreat remote from the haunts of the male, who it appears exhibits a propensity to devour her progeny if he discover the litter. To her young the female is a most attentive mother; she suckles them for three or four months, and they remain with her for a long time: an aged female is sometimes seen followed by several families, among which are some of the age of two or three years. These young rovers the French hunters call bêtes de compagnie. The wild boar seldom stirs from his lair during the day, and may therefore be regarded as in some degree nocturnal; on the approach of twilight, he rouses from his indolent slumbers, and sets out in quest of food, which consists of acorns, beech-mast, grain, different vegetables, and roots; in search of the latter, he ploughs up the ground with his snout: corn-fields in the vicinity of forests where wild hogs exist often suffer extensively from their nightly incursions. The wild boar, though not truly carnivorous, does not refuse animal matters which chance may throw in his way: he does not however ordinarily attack and kill others for the sake of their flesh, but only devours what he may meet with in his rambles. In the morning the wild boar returns to his lair in the thickest and most gloomy part of the forest, under a rock, in a cave, or under the canopy of gnarled and intertwined branches. When roused by the hunter and his dogs, the old boar retreats sullenly and slowly, gnashing his teeth, foaming with anger, and often stopping to receive his pursuers, on whom he often rushes with sudden impetuosity, striking with his tusks, goring dogs and men, and scattering terror around. When the boar turns upon a pack, the foremost dogs are sure to suffer, and several will fall by as many strokes. An instance is on record in which a boar turned suddenly upon a pack of fifty dogs which pursued him, and instantly despatched six or seven of them, wounding all the rest with the exception of ten. The young boar is less resolute than the old animal, and will run to a considerable distance before he is brought to bay; nor is the assault attended with any great degree of danger. In all ages, the chase of the boar has been a favourite diversion; the classic writings abound with allusions to it and to the risk incurred. Ovid (Fab. iv., lib. viii.) gives a spirited account of the chase, in which the fury and strength of the enraged beast are admirably depicted. It would seem that the ancients endeavoured to enclose the boar by nets so as to prevent his escaping into the recesses of the forest: the combat was close, and therefore dangerous; driven from his lair by the dogs, and hemmed in, the infuriated animal turned savagely upon his assailants, and died, after killing and wounding dogs and men, transfixed by spears and javelins. Our forefathers in the Middle Ages deemed the wild boar one of the noble "beastes of venery," and kept a powerful breed of hounds for the chase: the weapons used by the huntsmen were spears, and a sort of short sword, or couteau de chasse; the spears were used when the boar was brought to bay, and the attack gave abundant opportunities to the hunters of showing their skill and courage. The loud blast of the horn, mingled with the shouts of men and the baying of the hounds, proclaimed the vigorous home-thrust that struck the savage lifeless to the ground. Figs. 427, 428, and 428* are illustrative of the boar-hunt as conducted in Europe in the Middle Ages. Fig. 432 illustrates boar-hunting as practised in India at the present day. The hunters are always mounted on horseback, and, instead of meeting the animal with spears, attack him with javelins, which are launched at him as he flies, or as he rushes to the charge, which is often so determined that the horses cannot be brought to stand the shock, or, if they do, are thrown down and gored; serious accidents sometimes occur. Mr. Johnson relates an instance in which a large and resolute boar, after being driven by the hunters into a plain, stood at bay and challenged the whole party: he charged every horse that advanced within fifty yards of him, with great ferocity, causing them to rear and plunge, and throw off their riders, whose lives were in jeopardy: though many of the horses were accustomed to the sport, none would stand his charges, or bring the rider within javelin distance, and at last he fairly drove the party from the field; and then, gnashing his tusks and foaming, he made his way to the jungle, where it was useless to attempt to follow him.

In our own country the boar, reserved for the sport of the privileged classes, was protected by severe laws. By one of the edicts of William the Conqueror (A.D. 1087), it was ordained that any who were found guilty of killing a stag, roebuck, or wild boar were to have their eyes put out: sometimes, indeed, the penalty appears to have been a painful death.

At what precise period the wild boar became extinct in our island cannot be precisely determined; it is evident, however, that as population increased, and the vast woods which spread over many parts of the country were cut down and the land cleared, that the range of the boar would become more and more limited, and its numbers decreased, till at length its extirpation would be complete. We look in vain for the forest which, in the 12th century, covered the country to the north of London, and of which Fitzstephen, in the reign of Henry II., writes, observing that "on the north are corn-fields and delightful meadows, intermixed with pleasant streams, on which stands many a mill, whose clack is so grateful to the ear; beyond them an immense forest extends itself, beautified with woods and groves, and full of the lairs and coverts of beast and game, stags, bucks, boars, and wild bulls." Banished, however, as the wild boar is from among our native Mammalia, "its name is immortalized," as Mr. Bell observes, "by having given origin to the appellation of many places in different parts of the country, and by its introduction into the armorial bearings of many distinguished families of every division of the kingdom."

The skull of the hog (Fig. 429), which affords an index of the habits of the animal, is of a conical or wedge-like form; the base or occipital portion forms a right angle with the oblique upper surface, and a bold transverse ridge is formed by the union of the occipital and parietal bones. The nasal bones are prolonged nearly to the end of the snout, which, in the living animal, terminated in a moveable cartilaginous disc, pierced by the nostrils. The lower jaw is of great strength. The dentition (Fig. 430) is as follows:—Incisors, $\frac{6}{6}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{7-7}{7-7}=44$. The canines of the upper jaw are prismatic, and curve downwards, having their anterior surface worn by the action of the huge canines of the lower jaw, which are sharp, sweep out from the sides of the mouth, and often attain to the length of eight or ten inches, and sometimes even more. These canines or tusks are terrible weapons: rushing on his antagonist, the boar strikes obliquely upwards, right and left, with prodigious violence; a mode of action the best calculated for bringing these weapons into effective play, and in which the muscular powers of the neck and shoulders are the most advantageously and naturally exerted.

433, 434, *d*, *e*.—THE DOMESTIC HOG

is too well known to need any description; and its utility too well appreciated to require comment. It is not, however, valued alike in all countries, and in some is regarded with abhorrence. In India both Brahmin and Mussulman reject its flesh as food, yet in many districts of that country semi-domesticated hogs wander about the villages, feeding on the refuse which they pick up in the streets. Colonel Sykes states that in Dukhun "every village abounds with hogs, but any property in them is equally abjured by individuals and the community." Detestation of the hog was a feeling entertained by certain nations in remote antiquity. It was classed by the Jews among the vilest animals, and in Egypt the swineherd was numbered among the profane, and forbidden to enter the temples of their gods; even the lowest dregs of the people refused to bestow their daughter on him in marriage. The Egyptians sacrificed the hog to Bacchus, and to the moon when full. "In the evening of the festival of Bacchus," says Herodotus, "though every one be obliged to kill a hog before the door of his house, yet he immediately restores the carcass to the swineherd that sold him." The ancient Scythians, according to the same authority, made no use of swine, nor suffered any to be kept in the country. The Abyssinians and the Cophts of Egypt, as well as the Mohammedans, reject the flesh of the hog. Among the ancient Greeks and Romans, though the office of swineherd appears to have been held in contempt, the flesh of the hog was in high estimation, and a sucking pig was as favourite a dish as amongst ourselves in the present day. The Chinese have derived no prejudices against the hog from the Mohammedan nations of the East: on the contrary, they rear these animals in great numbers for the sake of their flesh; and even the numerous population who tenant the floating town of rafts or barges contrive to keep and rear them.

"One of the most singular circumstances," says Mr. Wilson, "in the domestic history of this animal, is the immense extent of its distribution, more especially in far-removed and insulated spots inhabited by semi-barbarians, where the wild species is entirely unknown. For example, the South Sea Islanders, on their discovery by Europeans, were found to be well stocked with a small black [illegible] hog; and the traditionary belief of the people in regard to the original introduction of these animals showed that they were supposed to be as anciently descended as themselves. Yet the latter had no knowledge of the wild boar or any other animal of the hog kind from which the domestic breed might be supposed to be derived." ('Quarterly Journal of Agriculture.')

Among our Saxon forefathers the hog was of great importance: its flesh was a staple article of consumption in every household, and a great portion of the wealth of the farmers and landed proprietors consisted of droves of swine, which were attended by swineherds, thralls, or bondslaves, and which were driven into the woods of oak and beech, in order to feed on acorns and mast, and all the while guarded from the attacks of the wolf. The domestic hog of that period appears to have closely resembled, in form and colour, the wild species, and the old unimproved breed, now seldom seen, may be regarded as its modern representative. (Fig. 433.) There are now in our island several breeds of this useful animal, of acknowledged excellence, the result of judicious crossings. The test of excellence is productibility, a readiness to become fat, small bone, and the quality of the whole animal when converted into bacon: size is of minor importance. The introduction of the small Chinese breed is one great source of improvement. The Chinese hog is short in the head, with sharp neat ears, low on the limbs, and high in the chine It is very prolific, and fattens readily. (Fig. 434, *g.*) The prevailing colours are black or half black and half white. This breed, or one closely allied to it, extends from China throughout various groups of islands in the Pacific.

The breed nearest to the Chinese in this country is the Suffolk (Fig. 434, *f*): these are generally white; they are compactly made, and deep in the chest.

Another source of improvement is the Neapolitan hog: this is a plump animal of a black colour, without any hair, and with a singular predisposition to become fat· it is however of a tender constitution. The pure black breed of Essex, which has very little hair, is closely allied to it, and when crossed with the Neapolitan produces a most valuable stock: a cross between the Neapolitan and Berkshire breed is also in high esteem. A breed between the Berkshire, Chinese, and Neapolitan may, by careful selection, produce every quality which can be desired: great fecundity, an early acquisition of fat, and moderate size, with admirable form and proportions. Our group of hogs (Fig. 434) represents—*a*, the wild boar; *b*, the old unimproved breed; *c*, the black or wire haired breed; *d*, *e*, boar and sow of the improved breed, *f*, the pure Suffolk breed; *g*, the Chinese breed.

The domestic hog is by no means destitute of intelligence, and little deserves the character of a stupid filthy brute, as some are pleased to call it. As regards filthiness, everything will depend on its keeper: it is true that, like the elephant and hippopotamus, it delights to wallow in the mire; but no animal more luxuriates in clean straw, and when it is styed up in filth justice is not done to it. The hog is a "huge feeder," but so are the horse and ox, and a fat hog is a more comely looking beast than one that is lean and ill-fed. With respect to intelligence, we rank it far before the ox and horse, though it is less docile. In Minorca it is used to draw the plough, and works well, and Pennant says that in the district of Murray, between the Spey and Elgin, it was formerly employed for the same purpose, and that a credible eye-witness informed him "that he had seen in his parish there, a cow, a sow, and two young horses yoked together and drawing a plough in light sandy soil, and that the sow was the best drawer of the four." The senses of taste, smell, and hearing are possessed in great perfection by the hog: it is a saying among a certain class of persons that pigs can smell the wind; they are certainly aware of the approach of a storm, and we have seen them agitated during its continuance, screaming, and running about with straw in their mouths, or carrying it to their sty as if to add to their shelter. In Italy advantage is said to be taken of the sense of smell with which this animal is endowed in searching for truffles; and in our own country the famous sow Slut was broke in to the gun, and stood to her game as stanch as the best pointer.

The genus Sus as at present constituted contains, besides the common wild hog and its domestic relatives, two other species known to naturalists: of these one is the Papuan hog, or Bêne of the natives of New Guinea (Sus Papuensis), figured and described in the 'Zoologie de la Coquille,' by MM. Lesson and Garnot. It is remarkable for its small size, and its light and agreeable proportions, and 'the shortness of the tusks.' It is common in the forests of New Guinea, where it is esteemed by the native Papuans as delicate food: they contrive to catch these animals when young, and rear them in a state of domestication.

The other animal is the Woodswine of South and Eastern Africa, and of Madagascar, the Bosch-Vark of the Dutch colonists of the Cape (Sus larvatus, Cuv.). This savage and formidable animal resembles the wild boar of Europe, but its head is larger in proportion, its snout broader, and an elevated callous protuberance is seated on the cheeks between the tusks and eyes, giving a revolting aspect to the physiognomy. Prompt and vicious, the Bosch Vark is much to be dreaded in combat, its strength and the size of its tusks rendering it a match for almost any foe. It dwells in excavations in the ground, where it is dangerous to attack it, as it rushes out suddenly from its retreat and deals rapid destruction among its assailants. Dr. Smith observes that this species is subject to great variety of colouring, scarcely any two specimens being precisely alike some are of a brownish black variegated with white, and others are of an almost uniform light reddish brown or rufous without white markings, and it is scarcely possible to say which is the most prevailing style of colouring. The bristles are long, particularly upon the upper parts of the neck and back; the canines are of huge size and strength, the ears are short, and thinly covered both without and within with coarse black hair, which is longest at their tips. The tail is thinly covered with black bristles. Average length of body, between four and five feet; of the tail, one foot.

The discovery of the bones of an extinct hog of huge size in the cavern of Sundwick in Westphalia is due to M. Goldfuss. Bones of three distinct species occur in the Epplesheim sand (Miocene division of tertiary deposits, Lyell), and fossil relics of a species have been found in Hutton Cave, in Mendip, and in other places.

Several species of an extinct genus (Chæropotamus) closely allied to the hog have been discovered in the gypsum of Montmartre, in certain strata in Switzerland, and in the Eocene formation of the Isle of Wight, &c.

Genus Phacochœrus.—The animals contained in this genus resemble the hog in manners, form, and aspect, so that, were it not for the peculiarity of their dentition, they would necessarily be included in the genus Sus. Their dentition, however, is so different from that of the hog as to justify their separation. Instead of presenting the ordinary structure, the grinders have a great analogy with those of the elephant they are composed of vertical cylinders of enamel, enclosing an osseous deposit, and are cemented together by cortical substance, or crusta petrosa. It is long before the root of these teeth is perfected, and they advance in rotation from behind forwards, pushing before them the first molars, which in old individuals are found to be either greatly reduced or to have entirely disappeared It is not till after ceasing to push forward that the roots become consolidated. With regard to number they appear to vary. In the skull of the Abyssinian Phacochœre (Ph Ælian, Rupp.), which we have carefully examined, the molars were found to be four on each side above and three below. From the first molar above, which was very small, to the third, the increase in size was gradual, but the fourth molar was long and narrowed gradually as it proceeded backwards Had the animal lived much longer, it is probable that the first molar would have disappeared· the dentition would then have been as represented in Fig. 436 The incisors were two above and six below. The tusks were enormous. It would seem that the presence of incisors is variable, for in the South African species they either do not exist or are undeveloped. Cuvier states that vestiges of them are sometimes found under the gum, but in specimens from Cape Verde the incisors are generally complete.

Fig. 436 is one side of the upper jaw of the South African Phacochœre Fig. 437, one side of the lower jaw of the Cape Verde species· Fig 438, a lateral view of the last molar tooth, which may be compared with the molar of the elephant.

The head of these animals is enormously large and heavy, the eyes are small and set high on the forehead, which is depressed between them, under each eye is a large coarse fleshy lobe, and a warty excrescence appears on each side of the muzzle, between the eye and the tusks. The muzzle is very broad, and the ears are erect.

435.—The South African Phacochœre

(*Phacochœrus Æthiopicus*, F. Cuvier), or Vlacke Vark of the Cape colonists. The phacochœre found in Guinea, at Cape Verde, and along the Senegal, is regarded as distinct from the present species by F. Cuvier, in consequence of the possession of incisors; and is termed by him Ph. Africanus. The range of the South African phacochœre, or Vlacke Vark, does not appear to be precisely determined; formerly it existed within the limits of the Cape colony, and still lingers on the frontier districts, but is much more common in the remoter latitudes. In the frontier districts these animals seldom venture to seek their food during the day; but in the countries inhabited by natives who are destitute of the efficient arms of the colonists they are at all times to be met, though their favourite feeding-times are early in the morning, late in the evening, and even during the night, if it be moonlight. When disturbed in its retreats, and especially when hunted, the Vlacke Vark is a very dangerous animal, for though it will not turn out of its way to give chase, yet if brought to bay, or forced to extremity, it attacks with furious impetuosity, and strikes with its tusks, which are dreadful weapons: it has been known to cut with one stroke completely through the fleshy part of a man's thigh. We learn that though this animal is used as food by the colonists, the Hottentots, and Bechuanas, it is rejected by the Coast Caffres, who are much more particular as to what they eat than any other natives of South Africa, and consider as an inferior class the persons who consume as food the articles which they hold as prohibited. The top of the head, the upper part of the neck, and the anterior part of the back are covered with very long and rigid bristles of a black-brown colour, those on the top of the head diverging like the rays of a circle. On the other parts the hair is shorter and of a dull brown, slightly inclined to white on the belly and flanks. The tail, except along the top, where it is furnished with a number of blackish brown bristles, is nearly naked. Length of head and body, about five feet; of the tail, about eleven inches.

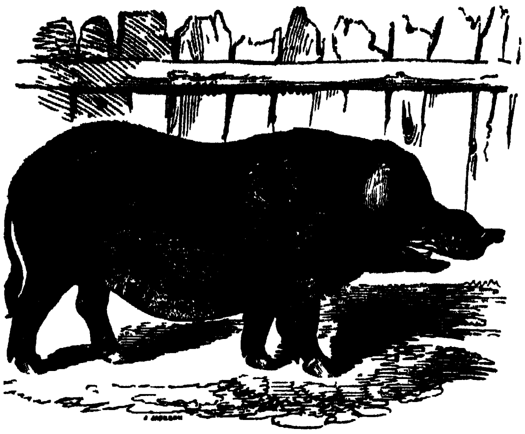
439, 440.—The Abyssinian Phacochœre

(*Ph Æliani*, Ruppell). This species was found by Ruppell first in Kordofan, but afterwards in greater abundance on the eastern slope of Abyssinia. It haunts low bushes and forests; and has a habit of creeping on its bent fore-limbs in quest of food. In this attitude, it uses its tusks in digging up or tearing out of the ground the roots of plants, which constitute part of its diet. When thus engaged it pushes its body forwards by means of its hind-legs, in order to move along. This habit of kneeling to feed has been observed in the species from Cape Verde. We have occasionally noticed it in the common hog.

441, 442.—The Anoplotherium.

Our figures give Cuvier's restoration of the outlines of two species of the extinct group of Pachydermata termed Anoplotherium, the fossil relics of which, mixed with those of the Palæotherium, occur in the gypsum-quarries near Paris, and also, though more rarely, in the neighbourhood of Orleans and Genoa. These Anoplotheria are remarkable for the characters of their dentition; the teeth consist in each jaw of six incisors, two canines, and fourteen molars, reckoning both sides together; and these are arranged in a continued and uninterrupted series, without any vacancy between the incisors and the canines, or between the canines and the molars. The canines resemble the incisors in form, and might be mistaken for them; the four posterior molars are like those of the rhinoceros The feet are cloven as in the deer, being divided into two toes, sheathed with a hoof at the extremity, in the deer and other Ruminants the metacarpal and metatarsal bones are blended into a single canon-bone, but in the Anoplotherium they are separate as in the hog. Allied to the Pachydermata in some points, and in others to the Ruminantia, the Anoplotheria appear to have occupied an intermediate station between these two great orders· their heads, judging from the skull, partook of the form of that of the horse and of the camel, the snout was not elongated into a proboscis as in the tapir or the elephant. The Anoplotheria are divided into three subgenera, on various minor details of structure. The restricted division Anoplotherium Proper comprehends two species, viz, A. commune (Fig. 441), about the size of the ass, and the A. secundarium, about the size of the hog. These animals were low on the limbs, and probably resembled the tapirs in their habits, but were furnished with a long tail compressed horizontally at the base, and rendering them more essentially aquatic: they resorted to lakes and marshes in search of aquatic plants, and, as the flattened form of the tail indicates, must have swum and dived with greater ease than either the hippopotamus or tapir.

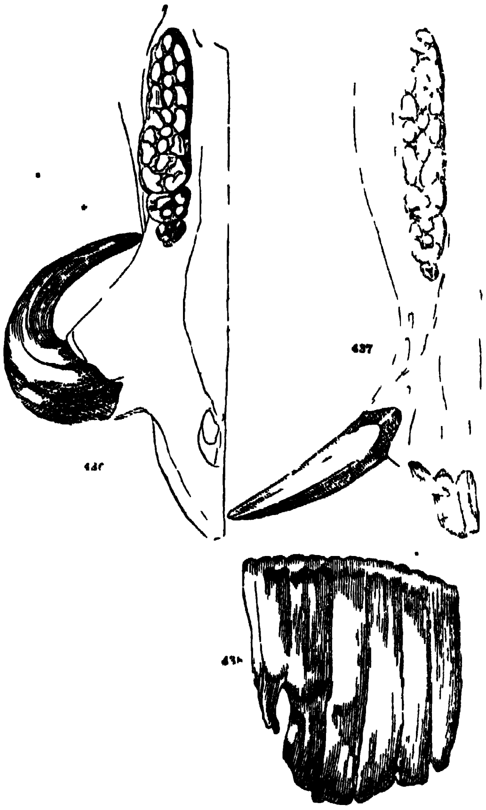
The subgenus Ziphodon contains but a single species (A. gracile: Fig. 442), a light, slender, graceful creature, with much of the contour of the gazelle: it was probably fleet and active, and was confined to the dry land, where it fed like the deer. The tail was short, and in this respect and in its general figure, as the skeletons prove, it must have exhibited a complete contrast to the low-built, heavy Anoplotherium commune. The third sub-



433.—Domestic Hog

431.—Female Wild Hog and Young

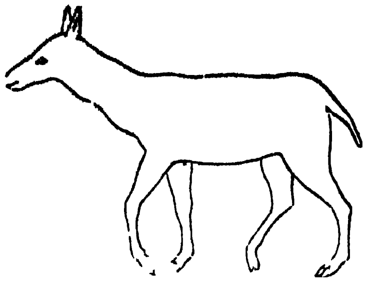
434.—Group of Domestic Hogs

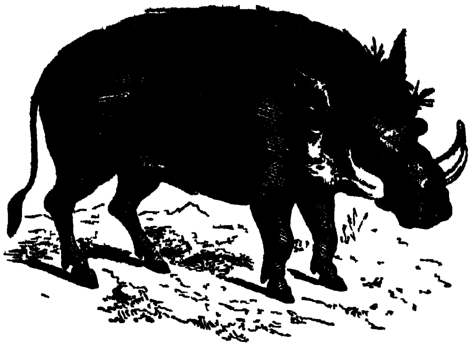


436 to 438.—Teeth of Phacochœr

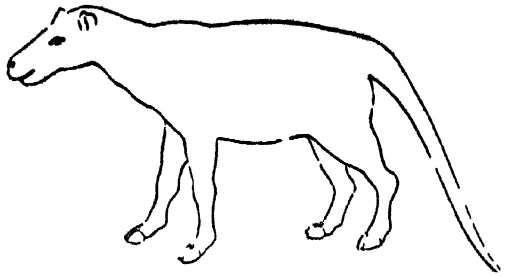
435.—African Boar.

[illegible].—Boar-hunting in India.





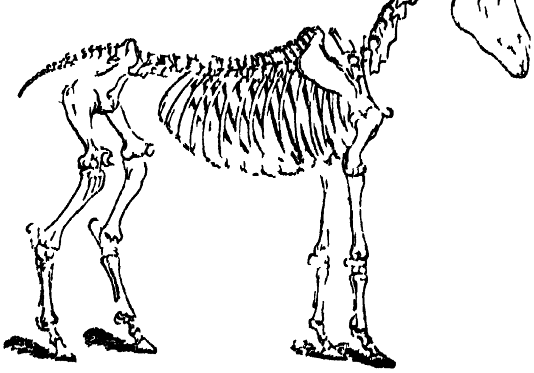
439 —Abyssinian Phacochœre



441 —Anoplotherium

428* —Grand Boar hunt.

440 —Abyssinian Phacochœre.



444* Skeleton of Horse

genus, Dichobunes, contains three species, D. leporinum, murinum, and obliquum: the first about the size of a hare; the other two, of a guinea-pig. They appear to have had much of the form, and probably of the habits, of the little musk-deer, or chevrotains.

Genus Equus.—This genus, which contains the Horse and its immediate relatives, presents us with a Solidungulous group of Pachyderms, of which the utility of some to man scarcely requires to be pointed out. These animals have but a single toe on each foot. The fore-arm (see skeleton, Fig 444*) consists of a single bone, made up, it is true, of an ulna and radius, but the ulna is only to be traced in the olecranon process showing itself as a fixed appendage to the radius at the elbow-joint. The carpus consists of seven bones, and to these succeeds a long metacarpal bone, in one solid piece, called the canon bone to this succeed three phalangal bones, forming one digit, the first is termed the pastern, the second the coronet or crown-bone, the last the coffin-bone, which is inclosed in a hoof of thick, firm horn On this the horse treads with an elastic step resulting from the oblique position of the bones of the leg and foot, but especially from the yielding of the pastern, its elasticity being provided for by a ligament which passes down the canon bone and along the pastern to the coffin-bone The expansibility of the hoof must not be overlooked, it is essential to a free and safe step, but is too often irreparably injured by the mode of shoeing pursued by farriers. Under the coffin-bone, forming a sort of sole, is a part called the frog, consisting of an elastic, fatty cushion, covered by a triangular elevation of horn, at each step the frog yields beneath the superincumbent pressure, and, swelling out laterally, expands the heels of the hoof. This frog ought always to touch the ground it does so naturally, and where bad shoeing prevents it, the crust of the hoof bearing all the weight of the body, and the shock of every step as the animal trots along a hard road, inflammation and disease ensue It has been said, that the canon bone of the horse, representing the metacarpus (and the same observation applies to the canon or metatarsal bone of the hind-leg), consists of a single piece there is, however, on each side at its inferior extremity a slender styloid-bone, narrowing as it proceeds to a point. These must be regarded as the rudiments of two additional metacarpal bones.

The dentition of the genus Equus is as follows·

$$\text{Incisors } \frac{6}{6}, \text{ canines in male } \frac{1-1}{1-1}, \text{ molars } \frac{6-6}{6-6} = 40.$$

The incisors in youth have broad edges channelled out into a cavity, which by degrees becomes obliterated. The molars have square crowns, sharply edged with enamel, in a crescent form, the canines are only in the males Many tricks are played by horse-dealers, to give apparent age to a colt, and thereby enhance its value, and, after maturity, to give to the teeth that appearance which they would have when the prime of strength and vigour was just attained to The following observations from the 'Penny Cyclopædia' are very excellent —

"The honest mouth of a three-year-old horse should be thus formed —the central incisors or nippers are palpably larger than the others, and have the mark on their upper surface evident and well defined They will however be lower than the other teeth The mark in the next pair of nippers will be nearly worn away, and that in the corner nippers will begin to wear.

"At three years and a half the second nippers will be pushed from their sockets, and their place gradually supplied by a new pair, and at four and a half the corner nippers will be undergoing the same process. Thus at four years old the central nippers will be fully grown the next pair will be up, but will not have attained their full height, and the corner nippers will be small with their mark nearly effaced. At five years old the mark will begin to be effaced from the central teeth, the next pair will be fully grown, and the blackness of the mark a little taken off, and the corner pair will be protruding or partly grown.

"At this period, or between the fourth and fifth year, another change will have taken place in the mouth, the tushes will have begun to appear There will be two of them in each jaw, between the nippers and the grinders, considerably nearer to the former than the latter, and particularly so in the lower jaw. The use of these tushes in the domesticated state of the horse is not evident, but they were probably designed as weapons of offence in the wild state of the animal. Attempts are too frequently made to hasten the appearance of the second and the corner teeth, and the gum is often deeply lanced in order to hasten the appearance of the tush

"At six years old the mark on the central nippers will be diminished, if not obliterated. A depression and a mark of rather brown hue may remain, but the deep blackened hole in the centre will no longer be found. The other incisors will also be somewhat worn, and the tush fully developed.

"At seven the mark on the next pair of incisors will have nearly disappeared and the tush will be rounded at the point and the edges.

"At eight the mark will have disappeared from all the incisor teeth, and the tush will be evidently rounder and blunter."

In the horse there are warty callosities on the inner aspect of the fore and hind legs, in the other species, on the fore legs only. The lips are muscular and prehensile, and the muzzle hairy.

443 —The Horse

(Equus Caballus) We present at one view a group of British horses, which cannot fail to interest those who admire this noble animal, and are aware (and who is not?) of the excellence of our breeds. Fig. 443 *a* represents the Welsh poney, *b*, the Shetland poney, *c*, the Cart Horse, *d*, the Hunter, *e*, the Racer Fig 444 is the copy of a horse's head, from a fragment in the Elgin Marbles, British Museum, which will serve to give an idea of the characters of the war horse of ancient Greece, and which forcibly calls to mind the splendid description in the book of Job– "Thou hast given the horse strength, thou hast clothed his neck with thunder (Job xxxix 19—25), or that of Virgil—"Tum siqua sonum procul arma dedere," &c. ('Georg' lib iii, line 83, et seq)

A natural question at the outset of our description of the horse suggests itself, it is one, however, which has been often asked, but which is not easy of solution What is the origin of our domestic horse, and at what period, and by what people, was it first reclaimed? We may at once state that the origin of the domestic horse is unknown, and probably does not exist The troops of wild horses which scour the deserts of Tartary are regarded by naturalists, and with justice, as the descendants of a domesticated stock, and the herds of horses which roam over the plains of South America are confessedly derived from horses introduced by the Spaniards, according to Azara, in 1535. It is a hazardous opinion, but some have been disposed to entertain it, that the horse as now existing is not the pure descendant of a single species, but a factitious being, the result of a mixture of closely-allied primitive species, whose hybrid offsprings, possessing prolific powers, have again and again blended together, till, by care, climate, and soil, the distinct breeds have been formed which are now spread over different parts of the globe How far this hypothesis, which was entertained by Pallas and others, approximates to the truth it is impossible to say, certain it is that no primitive species of horse, no wild descendant of the original stock, is now existing Whatever it once was, it exists no longer, nor know we when or under what circumstances it vanished from the face of the earth Of what country is the horse originally a native? According to Mr Bell, who considers it "at least highly probable that the Egyptians first reduced the horse under human subjugation, it is to the same country, or at least to those parts of Africa which were in close relationship to it, that we may reasonably look for its native locality before that event" It may be so, but we cannot help thinking that the wild horse (if specifically the same) was spread over many countries nor is it perhaps too much to suspect that the bones found so abundantly in superficial gravels, sands, and clays, &c, may be, some of them at least, the relics of the primitive race, from which the modern stock has descended, but which has, after giving to man a reclaimed progeny, passed utterly away With respect to the ox, Cuvier maintains a similar theory, and Mr Bell leans to the same opinion. "In this country," he observes, "and in many parts of the Continent, have occurred numerous fossil bones of oxen, with large horns," &c, and he adds, "I cannot but consider it as extremely probable that these fossil remains belonged to the original wild condition of our domestic ox—an opinion which Cuvier appears to have entertained, who calls the skulls 'crânes semblables à ceux d'un bœuf domestique' They are found only in very recent deposits, mingled with the remains of various other animals.'

It is generally supposed that the Egyptians were the first who reclaimed the horse, and this opinion is founded on the circumstance that in Scripture the first notice of the horse is in connection with Egypt, when Joseph attained to power and dignity, and that at a subsequent period Egypt supplied Solomon with horses. Certainly the horse was at an early period domesticated in Egypt, and used as an arm of war, and on state occasions: "And he (Pharaoh) made him (Joseph) ride in the second chariot which he had" (Gen. xli. 43); and during the seven years' famine Joseph not only sold corn out of the royal granaries for money, but "gave them bread in exchange for horses" (Gen. xlvii. 17); and no doubt Egypt had a noble breed. In their contests, however, for the Promised Land, we find the Israelites brought in collision with the Canaanites, Amorites and others, in whose armies were "horses, and chariots very many" (Joshua xi. 4); and we read that "he houghed their horses, and burned their chariots with fire'—so that other nations of that period besides the Egyptians employed this animal, and in the same manner. As far back as the records of history conduct us, we find the Scythians possessed of horses and celebrated as horsemen. Was the Scythian breed anciently obtained from Egypt? The Babylonians possessed vast numbers of horses Tritantæchmes, a Satrap of Babylonia, possessed, in addition to his war-horses, 800 for private use, and 16,000 brood mares. India possessed horses, and assisted Xerxes with cavalry and chariots of war; some drawn by horses, others by wild asses The Bactrians and Caspians also brought cavalry and infantry. (Herodotus) The same author, speaking of the products of India, viz. quadrupeds and birds, which are larger than those of any other country, excepts the horse, which is surpassed in size by the Nisœan horse of the Medes, of which ten gorgeously caparisoned added to the splendour of Xerxes's array, and Strabo expressly asserts that there was a dispute as to whether the Nisœan horse was a native of Media or Armenia, as specimens of the breed were to be found in both countries. Leaving undecided, as it ever must be, the origin and original country of the horse, we may observe, that at an early period the horse was used in our island. When Julius Cæsar invaded our shores, he was opposed not only by infantry, but by horsemen and charioteers, and the skill with which the horses and chariots were managed excited the great warrior's admiration—a circumstance sufficient to prove a long acquaintance with the animal, as well as that the Britons in Cæsar's time were more advanced in social refinement than some historians have admitted. We do not know with certainty the characters of the ancient British horse, yet, from the rapid movements of the cavalry and the manner in which the charioteers dashed along, we may readily infer that the horses were light, strong, docile, and spirited, probably they much resembled those used by the Cossacks of the Don and Wolga at the present day They were at all events highly valued, and were exported, together with British mastiffs, to Rome.

We know that the Romans possessed an excellent breed of horses, and paid great attention to them. In modern Italy the breed is crossed with the barb from the North of Africa, at least, the horses used for light work, the saddle, and trials of speed, are of this mixture, and the term barbari is given to them These barbari are small, generally rather under than over fourteen hands, clean limbed, well formed, compact, and spirited, giving evidence of good blood The barb is an offset of the Arab race, and is greatly mixed with the best Andalusian stock in Spain

The Persian horse closely resembles the Arab, but is generally taller. M Huzard states that in the north of Persia a race of horses exists stronger than the Normandy horse, and which are fed on the vast plains of Chirvan and Mazenderan He adds that these horses are in great request for the Persian cavalry.

The best horses in India are of Arabic or Persian descent In Moore's 'Notices of the Indian Archipelago, we are assured that in every country lying east of the Burrampooter and south of the tropic, the horse, however diversified, is little better than a poney.

This fact, after quitting Bengal, is first noticed in the countries of Cassay, Ava, and Pegue. Here the horse seldom equals thirteen hands high, but is active, spirited, and well formed As we proceed to the south and east, the horse becomes more diminutive, and those of Lao, Siam, and the southern provinces of China are inferior in size and beauty to those of Ava and Pegue. The Siamese and Cochin-Chinese have no cavalry, and make no use of their poneys except for riding on ordinary occasions. Even for this last purpose they are not esteemed, the elephant being always preferred as a more respectable and dignified mode of conveyance. In the Malayan Peninsula there are no plains or roads, and the inhabitants, living almost exclusively on the low and woody banks of the rivers, naturally substitute their canoes and boats for beasts of carriage and burden, and hence the horse has not yet been naturalised amongst them. Proceeding eastward in the Malayan Islands, the horse first occurs in the interior of Sumatra, and here we have two of the best breeds known in those countries, the Achin and Batta, both very spirited, but small, and better suited for draught than the saddle.

Of all the countries of the Archipelago the horse is most frequent in the island of Java. The Javanese poney is generally larger than that of Sumatra, and has more the form of a horse, is more temperate, but less gay and handsome. Two distinct races may be described—that of the plains, and that of the mountains. The first of these is somewhat coarse, somewhat sluggish in disposition, and so large as occasionally to reach the height of thirteen hands and an inch. The second is small and hardy, and, as in the case of the kuningan, a breed in the interior of Cheribon, sometimes very handsome. The horse is used in Java for the saddle, and as a beast of burden, but never by the natives in agricultural labour or any species of draught. Europeans use them extensively in their carriages, and on the level and well-constructed roads of Java the traveller is conveyed at the rate of twelve and even fifteen miles an hour in a carriage drawn by four of these little animals. We must take this opportunity, however, to remark that there is no advantage whatever in the employment of this diminutive breed of cattle. A pair of good English post-horses will go a stage of fifteen miles on such roads as those of Java without difficulty. To perform the same distance in a carriage of the same weight requires twelve Javanese poneys. One horse therefore is equal to six poneys, and as at the utmost a full-grown horse will not consume above double the food of a poney, the charge of maintaining him, in proportion to the work he is capable of performing, is no more than one third.

The horse, but of a very inferior breed, is found on the islands of Bali and Lombok. Passing over these, we come to the island of Sambawa, which produces two different races—those of Tamboro and Bima. The last, especially those of Gunong Api, are by far the handsomest breed of the Archipelago, and are extensively exported. The Bima poneys possess strength, symmetry, and beauty, and at first appearance bear some resemblance to the Arab. Upon a closer examination, however, it does not appear that they are entitled to be considered as possessed of the qualities designated *blood* in the language of the turf, and which is only to be found in the Arab, and his descendant—the English race-horse. The limbs indeed exhibit this character, but it is wanting in the skin and coat, which are thick and harsh, and it is not even present in the shape and expression of the head, although very pretty.

After passing Sambawa, the horse is traced to Flores, Sandal-wood Island, and Timor, but nowhere farther to the east, being unknown in the Moluccas, New Guinea, and the neighbouring islands. Next to Java, the horse is found in the greatest abundance on the island of Celebes. Upon the whole, we consider this to be the best breed of the Archipelago. In the great island of Borneo the horse is found only in its north-eastern extremity opposite to the Suluk cluster, where also, as well as in the group of the Philippine islands, it is frequent. The Philippine poney bears some resemblance to that of Celebes, but, judging from the specimens we have seen, is somewhat larger than this, and in figure and beauty inferior to the breeds of Sambawa, Java, and Sumatra. We do not imagine that it contains any admixture of the Spanish blood, although this has been suspected.

Within the Archipelago, as in other parts of the world, the colour of the horse is singularly connected with quality, temper, and locality. The prevailing colour of the Achin poneys is piebald, which becomes rarer and rarer as we proceed eastward. A Bima poney of this colour is as rarely seen as a black Arab. The prevailing colour of the Batta poney is bay and mouse-colour. In Java the best horses are those of the most prevalent colours, viz., bays and greys, the roan and mouse-coloured horses are very generally good. The worst colours are black and chestnut. The Javanese have such a dislike to the latter colour, that chestnut horses are not permitted to appear at their public tournaments. Bays, greys, and duns are the best and most frequent colours in the Bima poneys. Blacks and chestnuts are not frequent, but they are not considered inferior. Greys and bays prevail amongst the poneys of Celebes and the Philippines, nearly to the exclusion of all others.

In the plains of Celebes wild herds of horses exist, doubtless the descendants of a domesticated stock.

During the dominion of the Romans in Britain it is very probable that some modification in the characters of the British horse would result from its admixture with other breeds imported by the conquerors from Italy, Gaul, and Spain; but to what extent this took place we have no means of ascertaining. At a subsequent period, during the Saxon sway, it would appear that a fine breed existed in our island: for we find that Athelstan (A.D. 930) forbade the exportation of horses under any circumstances, except as presents to monarchs, whence it may be concluded that the English horse was then valued on the Continent. Besides endeavouring to preserve the native breed, Athelstan endeavoured to improve it, and received several German running-horses, that is, horses formed for speed, from Hugh Capet of France.

The Norman Conquest was productive of changes in the English breed, resulting from the introduction of the Spanish horse by some of the barons on the estates they had acquired by the right of the sword. The Crusades brought the English into contact with the spirited horses of Arabia and Syria; and there is little doubt that some were brought to our country. Two horses of Eastern origin and purchased at Cyprus, were possessed by Richard Cœur-de-Lion, and are celebrated as unequalled for speed: most probably they were not adapted for the tournament or the shock of battle, or the weight of a knight cased in a heavy mail.

In the reign of John, who, as Rapin observes, scarcely possessed one valuable qualification, chosen horses were introduced by his direction from Flanders, for the purposes of improving the breed of draught horses, and that monarch himself accumulated a stud of the most superb horses to be found.

During subsequent reigns Spanish barbs, Lombardy war horses, and heavy Flanders horses, were obtained, and thus gradually three sets or breeds of horses became established, exclusive of the poney, which, time immemorial, has inhabited the mountains of Wales and Scotland, and the Shetland Islands.

Of these breeds, one was the war horse, fitted to bear a warrior clad in heavy armour, oppressive to the wearer, but more to the horse, which was also to a great degree protected in the same manner. Its principal requisite was strength and endurance, not, however, to the exclusion of a certain degree of fleetness: it probably resembled the coach-horse of the present day, and was a powerful animal, of high action and great spirit. Besides this stalwart breed, there was evidently a lighter race, fitted for ordinary purposes, of moderate stature, fleet, yet strong, and capable of undergoing fatigue. Horses of this kind were termed running-horses: they were used as hackneys, for travelling, and also for running races, a sport practised at Smithfield as early as the time of Henry II., though racing cannot be said to have been then in its palmy days. It was in the reign of Henry VIII., and especially of Elizabeth, that regular race meetings were established at Chester, Stamford, and elsewhere; gradually a passion for the sport increased, and in the reign of James I., who encouraged racing both in England and Scotland, it assumed a more definite character, and became conducted according to fixed regulations. The breed appropriated to this sport, originally selected for speed, now became improved by Arab, Turkish, and Barbary admixture. James I. introduced the Arab, and purchased one of great celebrity for the then enormous sum of 500*l.* In the time of Charles I., Turkish and Barbary horses were obtained, and also in the reign of Charles II. It was in the reign of Queen Anne that the celebrated Darley Arabian, bred in the deserts of Palmyra, was introduced, and which may be regarded as the progenitor of the most celebrated of our modern racing stock. He was the sire of Flying Childers. At a subsequent period, Lord Godolphin's barb, generally called the Godolphin Arabian, contributed to the celebrity of the English racer. From these and from other Eastern horses, which might also be enumerated, have descended a stock unequalled by any in the world for spirit and fleetness. Such, then, is the more than half Oriental origin of our racer; but while this stock was thus rising out of the old English running-horse, that breed itself partook of the improvement, and we have now the half blood saddle-horse and the three-parts-blood hunter.

The third breed of the olden days was heavier and slower than the war-horse, and used for the purposes of draught. This breed, overlooked by the nobles, would necessarily vary in qualities as circumstances might influence it; but in proportion as the war-horse and hackney improved, so, indirectly, would the old cart-horse become elevated into the Cleveland bay, the Suffolk punch, and the huge Lincolnshire black.

The Suffolk punch is now seldom seen pure, being much crossed with other breeds. The Cleveland bay is confined principally to Durham and Yorkshire. The Lincolnshire black exceeds all in size, and is a noble and massive animal. Its perfection is to be attributed to the Flanders horse; and it is of this admirable mixed breed that the teams in the brewers' and distillers' carts in London are chiefly composed. No one can behold them without being struck with their appearance. Their strength is prodigious, and many stand seventeen hands in height.

From the varied stocks of horses which we now possess within the limits of our own island, by selection and judicious admixture, may be acquired breeds modified to suit every purpose of use or luxury, from the racer to the serviceable roadster, from the splendid carriage-horse to the farmer's hard-working servant.

When we look at the elephantine dray-horse, and the Welsh and Shetland poneys, the transition with respect to size is so great, that we are almost startled by the comparison, and wonder that such a difference can exist between two individuals of the same species.

Wales and the Shetland Isles have been ever celebrated for miniature horses of great beauty, spirit, strength, and hardiness. The Welsh poney is often a model: a small head, high withers, a deep yet round body, short joints, flat legs, and small round hoofs, characterise him; his ears are small, his eyes full and animated, and his actions are free and vigorous.

The Shetland poney is still less in size than the Welsh, and is often very handsome, but the shoulders are usually low and thick; the limbs, however, are well knit, and the strength of the animal in proportion to its size is astonishing. In 1831 we measured a poney of the Shetland breed of very small dimensions, but of great beauty. Its height at the withers was only thirty-four inches; its length, from between the ears to the insertion of the tail, following the curve of the neck and back, four feet two inches.

Poneys of different degrees of value range the New Forest, Exmoor, and the Highlands of Scotland, but much attention is not paid to their breeding.

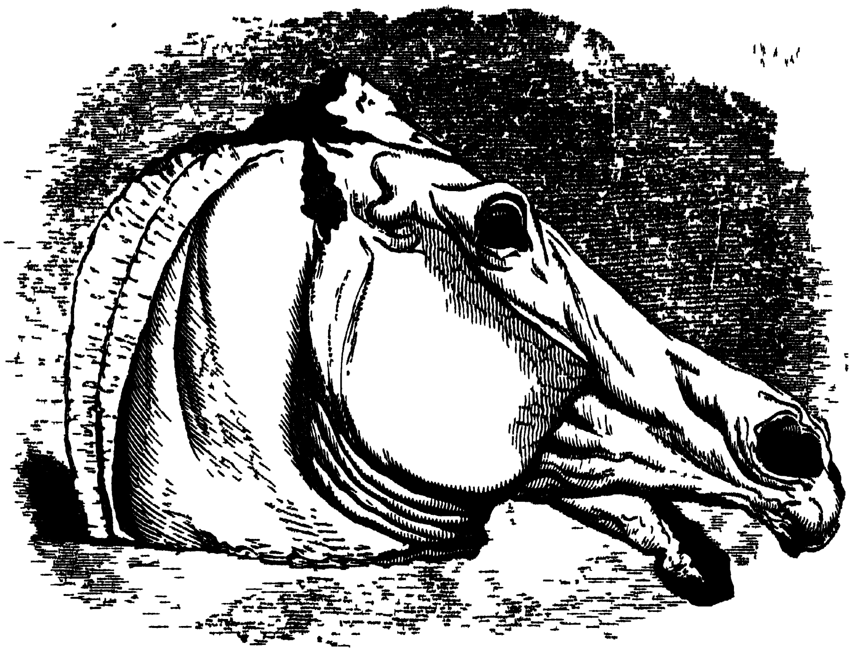
We have already stated that at a very early period the horse was employed in Egypt, both for the saddle and in drawing chariots. Among the very interesting series of Egyptian paintings in the British Museum is one (see Fig. 409) representing in the upper compartment a pair of horses yoked to a light chariot, of which one (the foreground horse) is black, the other, of which the head, limbs, and tail are partially shown, is red. In the lower compartment are also a pair of horses, as most suppose, of a pale milk colour, attached to a chariot: one is about to eat or drink from a vessel before it. This chariot or car is perhaps intended to carry the sheaves of corn which a reaper is cutting. It has been observed that the tails of these horses appear as if shaved, with a tuft left at the end; but we are inclined to think the animals are intended as mules, not horses, both from this appearance of the tail, and from the marked difference in the contour between them and the horses of the upper compartment, which cannot be mistaken. The chariot they are yoked to is a war-chariot, the form of which is more definitely given at Fig. 455, and which will convey a clear idea of the chariots with which Pharaoh pursued the Israelites, or of that to which Achilles lashed the body of Hector before the walls of Troy.

It is remarkable that though there was a mounted cavalry in Egypt, and that Solomon's horsemen were mounted on trained Egyptian horses, there is but one representation of a man on horseback in the whole range of the sculptured and painted antiquities of that country. The copy, Fig. 165, will be regarded with interest: the animal in all its points is an Arab.

At what period the Arabs began to employ the horse is not very clear; certainly not till a comparatively late era, nor, as far as we are aware, is it known whence they obtained their breed. May it not be descended from the stock of Egypt, with which Solomon replenished his stables? According to Burckhardt, there are three breeds of horses at the present day in Syria—the true Arab breed, the Turkman, and the Kourdy, which last is a mixture of the two former. The Turkman horses, from their superior size and more martial appearance, displaying when dressed the Turkish trappings to the greatest advantage, are preferred by the Osmanlis to the Arab horses. They are trained to walk gracefully, to set off suddenly at full speed, to turn with the gentlest touch, and to stop short instantaneously.

The Arabian horses are of more slender make, and less showy in appearance than the Turkman, but they are beautifully limbed, more hardy, and much fleeter. The esteem in which the Arabs hold them, the scrupulous care taken to preserve the purity of the breeds, and the reluctance with which the Arabs part with their mares, are circumstances frequently noticed by travellers. The Rev. V. Monro, in his 'Summer's Ramble in Syria,' relates that on the visit to the river Jordan, one of the Arab escort, "a great ruffian, was mounted on a white mare of great beauty; her large fiery eye gleamed from the edge of an open forehead, and her exquisite little head was finished with a pouting lip and expanded nostrils; her ribs, thighs, and shoulders were models of make, with more bone than commonly belongs to the Syrian Arab, and

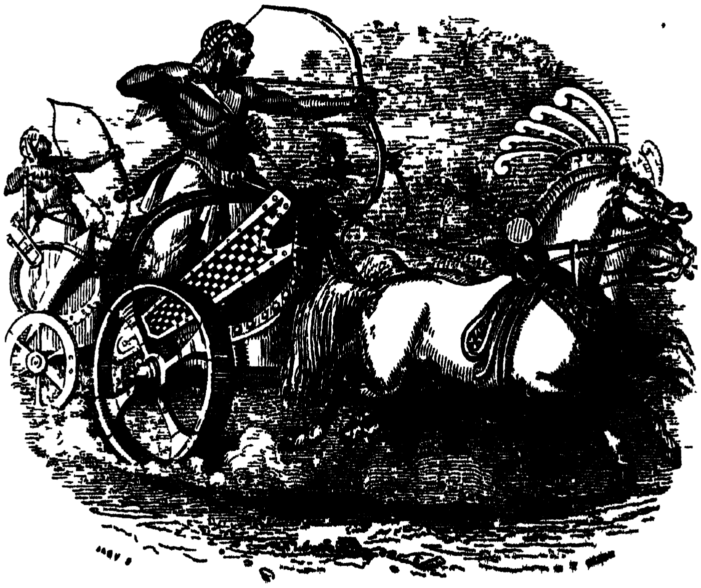
456 —Equestrian Game of the East



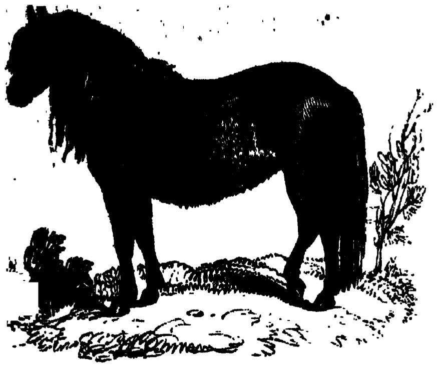
444 —Horses Head.

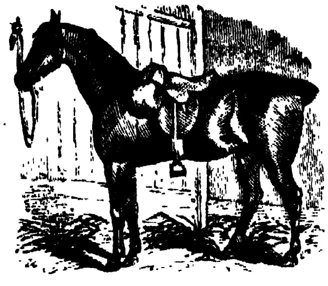
443 —Group of Horses.

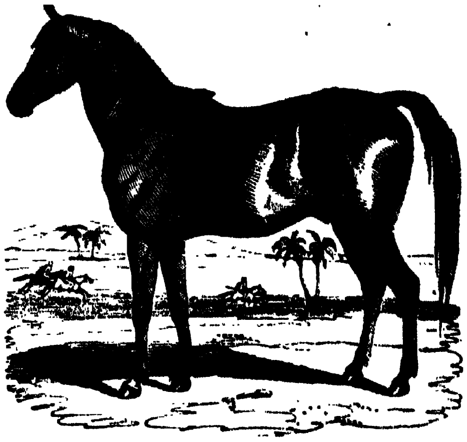
457 —Arabian War horse.

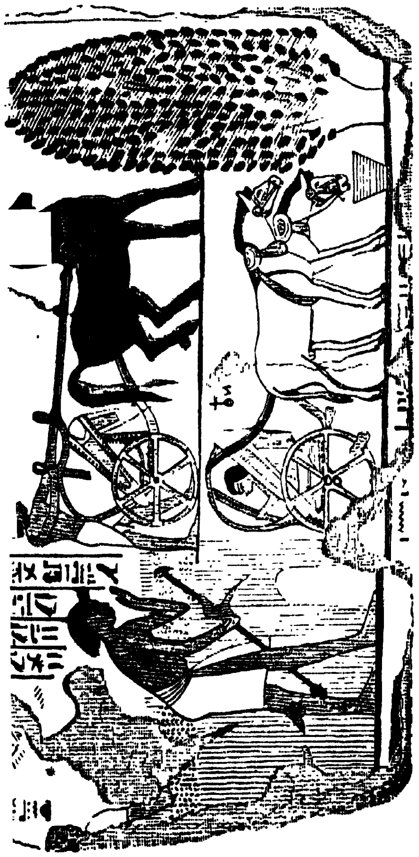


455 —Egyptian War-chariot.

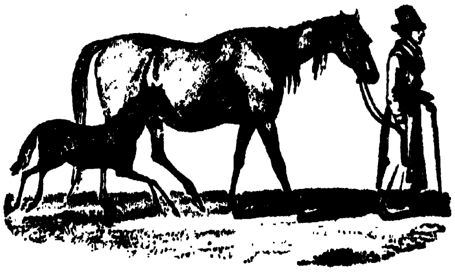

466.—Welsh Pony.

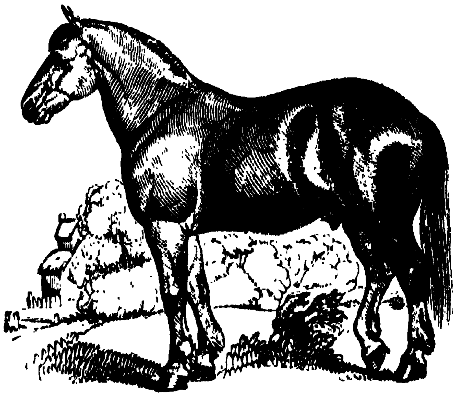

462.—Old Roadster.


463.—Anglo-Arab.


460.—Egyptian Painting, in the British Museum.

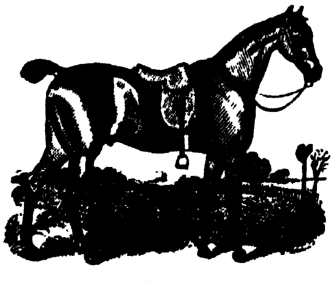
467.—Old English War-horse.


464.—Racer, Mare and Foal.


461.—English Cart-horse.

465.—Egyptian horseman.

459.—Arabian Horse.


466.—English Hunter.

463.—Turkish War-horse.

her stately step received additional dignity from that aristocratic set on, and carriage of the tail, which is the infallible indication of good family. Having inquired her price, I offered the sum, whereon the dragoon asked one-third more. After much abating and debating, I acceded, and he immediately stepped back in the same proportion as before. This is invariably the practice with the Arabs. I therefore discontinued my attempts to deal. The Arab said he loved his mare better than his own life; that money was of no use to him, and that when mounted upon her he felt rich as a pasha. Shoes and stockings he had none, and the net value of his dress and accoutrements might be calculated at something under seventeen-pence sterling."

The fondness for their horses which the Arabs manifest partakes of the extravagance of Oriental feelings: they rear them up in their tents, among their children and family: they caress them, and apply to them the most endearing epithets: witness the lamentations of an Arab, Ibrahim Abou Vouasses, over a favourite mare of noble race, which he had parted with; but which he frequently went to Rama to see: "He would embrace her," says D'Arvieux, "and wipe her eyes with his handkerchief, and rub her with his shirt-sleeves, and would give her a thousand blessings during whole hours that he would be talking to her. 'My eyes, my heart, my soul,' would he exclaim; 'must I be so unfortunate as to have thee sold to many masters, and not be able to keep thee myself? I am poor, my gazelle. You know well enough, my sweet, that I have brought thee up like a child; I never beat thee, never chid thee, but did cherish thee as the apple of mine eye: God preserve thee, my dearest; thou art beautiful, thou art sweet, thou art lovely: God defend thee from the evil eye:' and so he would go on saying a thousand things like these; he then embraced her, kissed her eyes, and went backwards bidding her the most tender adieus."

The Arabs prefer mares for riding, the Turks prefer horses, and this difference of taste acts very well. The price of an Arab horse in 1810-1816 was, according to Burckhardt, from 10*l.* to 120*l.*, but the price of a mare varies from 60*l.* to 200*l.* Some have sold for 500*l.*, and Burckhardt mentions a sheikh who purchased a celebrated mare for 400*l.*, with an agreement to give to the seller the first female colt she produced, or to keep the colt and return the mare.

The Arab horses seldom exceed fourteen hands in height, but have all certain characteristic beauties which distinguish their breed from any other. Five noble breeds are counted, each, as is said, deduced from one of the five favourite mares of Mohammed. But these five races diverge into infinite ramifications; and any mare of superlative excellence may give origin to a new breed, the descendants of which are called after her. "On the birth of a colt of noble breed, it is usual to assemble witnesses to write an account of its distinctive marks, with the name of its sire and dam. These genealogical tables never ascend to the grand-dam, because it is presumed that every Arab of his tribe knows by tradition the purity of the whole breed. Nor is it always necessary to have such certificates; for many horses and mares are of such illustrious descent that thousands might attest the purity of their blood. The pedigree is often put into a small piece of leather, covered with a waxed cloth, and hung by a leather thong round the horse's neck." *(Palestine.)*

Figs. 456, 457, 458, 459, are spirited illustrations of the Turk and Arab horse, and embody our ideas of its docility, and the fire and energy of its temperament. Fig. 456 represents the mode of playing the ball with a goff-stick on horseback, as practised in Turkey and Syria, and proves how admirably the spirited animals are trained, obeying the least touch of the bridle, wheeling, galloping at full speed, and stopping suddenly at the will of the rider. In Syria and elsewhere in western Asia the horse is fed upon chopped straw and barley, and of this provender a certain quantity is given morning and evening, none being supplied in the interim. In the spring season the horses are fed from 40 to 50 days on green barley cut as soon as the corn begins to ear. This is termed tying down to grass, during which time the animals remain constantly exposed in the open air, and for the first eight or ten days are neither curried, mounted, nor led about. After this they are dressed as usual and rode out gently, but are never much worked during the grass season. Some feed the horses with cut barley in the stable-yards, but the general practice is to confine them to a certain circuit by means of a long tether in the barley-field. This grazing is considered of great service to the health of the horses, and gives a beautiful gloss to their skin.

Some Arab tribes, however, do not thus give their horses green barley, but allow them to feed on the herbs of the desert, and give them a paste made of dates and water, and camel's milk to drink. "Even flesh, raw as well as boiled, is given to the horses in some quarters, together with the fragments of their owner's meals." An inhabitant of Hamah assured Burckhardt that he had often given his horses roasted meat before the commencement of a fatiguing journey, that they might be better able to endure it; and the same person, fearing lest the governor should take from him his favourite horse, fed him for a fortnight exclusively upon roasted pork, which so excited its spirit and mettle, that it became unmanageable, and no longer an object of desire to the governor. That the horse should under any circumstances be brought to eat animal food is very startling, but Burckhardt's authority induces us to believe it. It serves to show how domestication may modify animal instincts, nor is it perhaps more strange than that the carnivorous dog and cat should be brought to eat bread and boiled greens, to which latter we have known cats apparently partial, feeding upon them when even meat was at hand. Horses will drink ale with great relish; and the taste in this instance is certainly an acquired one.

With respect to the wild horses in the countries bordering the Volga and the Oural, little is accurately established. They are said to associate in troops headed by a leader, but from all accounts to be depended upon they are by no means remarkable for beauty, though they appear to be fleet and hardy. In the Museum at Paris is the specimen of a wild horse from the country of the Bashkirs: it has a heavy, clumsy head, and short limbs; and the hair, of a dirty greyish white, is long and shaggy, and hangs in a beard-like manner under the lower jaw. Pallas describes a young mare caught in the country between the Jaik and the Volga, which became very docile: its limbs were strong, the head large, the ears long and lying back upon the occiput; the hoofs small and somewhat pointed, the colour light bay, with a black mane and tail. In South America the rich plains extending from La Plata to Paraguay are tenanted by herds of horses, in a wild condition, the descendants of those originally introduced by the Spaniards. These horses are caught and broke in, and the singular mode in which their subjugation is effected is thus described by Captain Head:—"A man, mounted on a strong steady horse, threw his lasso over the neck of a young horse, and dragged him to the gate. For some time he was very unwilling to leave his comrades, but the moment he was forced from them, his first idea was to gallop away; however, the jerk of the lasso checked him in the most effectual manner. The Peons now ran after him on foot and threw the lasso over his four legs just above the fetlocks, and, twitching it, they pulled his legs from under him so suddenly that I really thought the fall he got had killed him. In an instant a Gaucho was seated on his head, and with his long knife in a few seconds cut off the whole of the horse's mane, while another cut the hair from the end of the tail. This they told me is a mark that the animal has been once mounted. They then put a piece of hide into his mouth to serve as a bit, and a strong hide-halter on his head. The Gaucho who was to mount arranged his spurs, which were unusually long and sharp; and while two men held the animal by his ears he put on the saddle, which he girthed extremely tight; he then caught hold of the horse's ears, and in an instant vaulted into the saddle; upon which the man who was holding the horse by the halter threw the end of it to the rider, and from that moment no one seemed to take any further notice of him. The horse instantly began to jump in a manner which made it very difficult for the rider to keep his seat, and quite different from the kick or plunge of an English horse; however the Gaucho's spurs soon set him going, and off he galloped, doing everything in his power to throw his rider. Another horse was immediately seized; and so quick was the operation that twelve Gauchos were mounted in a space which I think hardly exceeded an hour."

The neigh of the horse, contradistinguished from the bray of the ass—its general form and proportions—and our mode of defending its hoofs, a mode unpractised in antiquity, are known to all.

Fig. 461 represents the English Cart-horse; Fig. 462, the old Roadster; Fig. 463, the Anglo-Arab; Fig. 464, the Racer, mare and foal; Fig. 466, the Welsh Pony; Fig. 467, the old English War-horse; Fig. 468, the English Hunter. Fig. 469 is the Head of a Horse in Greek statuary.

The following original anecdotes, proving the sagacity of the horse, were sent to the 'Penny Magazine' from a correspondent. They refer to horses bred and reared in North America:—

"A short distance below Fort Erie, and about a mile from where the river Niagara escapes over a barrier of rock from the depths of Lake Erie, a ferry has long been established across that broad and there exceedingly rapid river, the distance from shore to shore being a little over one-third of a mile. On the Canada side of the river is the small village of Waterloo, and opposite thereto, on the United States side, is the large village of Blackrock—distant from the young and flourishing city of Buffalo two miles. In completing the Erie Canal, a pier or dam was erected—up and down the river, and opposite to Blackrock, at no great distance from the shore, for the purpose of raising the waters of the Niagara to such a height that they might be made to supply an adjoining section of the Erie canal. This pier was (and is) a great obstruction to the ferry-boats; for previous to its erection passengers embarked from *terra firma* on one side of the river, and were landed without any difficulty on the other: but after this dam was constructed it became necessary to employ two sets of boats—one to navigate the river and the other the basin; so that all passengers, as well as goods or luggage, had to be landed upon this narrow wall and re-shipped. Shortly after the erection of the pier-dam, a boat propelled by horses was established between this pier and the Canada shore. The horses moved upon a circular platform, which consequently was put in motion, to which other machinery was connected, that acted upon paddle-wheels attached to the sides of the boat. The boat belonged to persons connected with the ferry on the American side of the river; but owing to the barrier formed by the pier, the horses employed on the boat were stabled at night in the village of Waterloo. I well recollect the first day this boat began to ply,—for the introduction of a boat of that description, in those days, and in such a situation, was considered an event of some magnitude. The two horses (for that boat had but two) worked admirably, considering the very few lessons they had had previous to their introduction upon the main river. One of the horses employed on the new ferry-boat had once been a dapple-grey, but at the period I am speaking of he had become white. He was still hale and hearty, for he had a kind and indulgent master. The first evening after the horses had been a short time in the stable, to which they were strangers, they were brought out for the purpose of being watered at the river, the common custom at this place. The attendant was mounted upon the bay horse—the white one was known to be so gentle and docile that he was allowed to drink where he pleased. I happened to be standing close by, in company with my friend W——n, the ferry contractor on the Canada side, and thus had an opportunity of witnessing the whole proceedings of old Grizzle, the name that the white horse still went by. The moment he got round the corner of the building, so as to have a view of his home on the opposite side, he stopped, and gazed intently. He then advanced to the brink of the river,—when he again stopped and looked earnestly across for a short time;—then waded into the water until it had reached his chest,—drank a little, lifted his head; and, with his lips closed and his eyes fixed upon some object upon the further shore, remained for a short time perfectly motionless. Apparently having made up his mind to the task, he then waded farther into the river until the water reached his ribs,—when off he shot into the deep water without hesitation. The current being so strong and rapid, the river boiling and turmoiling over a rocky bed at the rate of six miles the hour, it was impossible for the courageous and attached animal to keep a direct course across, although he breasted the waves heroically, and swam with remarkable vigour. Had he been able to steer his way directly across, the pier-wall would have proved an insurmountable barrier. As it was, the strength of the current forced him down to below where the lower extremity of this long pier abuts upon an island, the shore of which being low and shelving, he was enabled to effect a landing with comparative ease. Having regained *terra firma*, he shook the water from his dripping flanks, but he did not halt over a few minutes, when he plunged into the basin, and soon regained his native shore. The distance from where Grizzle took the water to where he effected a landing on the island was about seven hundred yards; but the efforts made to swim directly across, against the powerful current, must have rendered the undertaking a much more laborious one. At the commencement of his voyage his arched neck and withers were above the surface, but before he reached the island his head only was visible. He reached his own stable-door, that home for which he had risked so much, to the no small astonishment of his owner. This unexpected visit evidently made a favourable impression upon his master, for he was heard to vow, that if old Grizzle performed the same feat a second time, for the future he should remain on his own side of the river, and never be sent to the mill again. Grizzle was sent back to work the boat on the following day, but he embraced the very first opportunity that occurred of escaping, swam back in the way he had done before, and his owner, not being a person to break the promise he had once made, never afterwards dispossessed him of the stall he had long been accustomed to, but treated him with marked kindness and attention."

"During my residence on the head-waters of the Susquehana, I owned a small American horse, of the name of Charlie, that was very remarkable for his attachment to my own person, as well as for his general good qualities. He was a great favourite with all the family; and being a favourite, he was frequently indulged with less work and more to eat than any of the other horses on the farm. At a short distance from the dwelling-house was a small but luxuriant pasture, where, during the summer, Charlie was often permitted to graze. When this pasture had been originally reclaimed from its wild forest state, about ten years previous to the period of which I am speaking, four or five large trees of the sugar-maple species had been left standing when the rest were cut down, and means had afterwards been found to prevent their being scorched by the fire at the time the rest of the timber had been consumed. Though remarkably fine trees of their kind, they were, however, no great ornament, their stems being long and bare, their heads small, and by no means full of leaves—the case generally with trees that have grown up in close contact with each other in the American forests. But if they were no ornament, they might serve as shade-trees. Beneath one of these trees Charlie used to seek shelter, as well from the heat of the meridian sun, as from the severe thunder-gusts that occasionally ravage that part of the country On an occasion of this sort Charlie had taken his stand close to his favourite tree, his tail actually pressing against it, his head and body in an exact line with the course of the wind; apparently understanding the most advantageous position to escape the violence of the storm, and quite at home, as it were, for he had stood in the same place some scores of times The storm came on, and raged with such violence that the tree under which the horse had sought shelter was literally torn up by the roots. I happened to be standing at a window from whence I witnessed the whole scene. The moment Charlie heard the roots giving way behind him, that is, on the contrary side of the tree from where he stood, and probably feeling the uprooted tree pressing against his tail, he sprang forward, and barely cleared the ground upon which, at the next moment, the top of the huge forest tree fell with such a force that the crash was tremendous, for every limb and branch were actually riven asunder. I have many a time seen horses alarmed, nay, exceedingly frightened, but never in my life did I witness anything of the sort that bore the slightest comparison to Charlie's extreme terror; and yet Charlie, on ordinary occasions, was by no means a coward He galloped, he reared his mane and tossed his head, he stopped short, and snorted wildly, and then darted off at the top of his speed in a contrary direction, and then as suddenly stopped and set off in another, until long after the storm had considerably abated, and it was not until after the lapse of some hours that he ventured to reconnoitre—but that at a considerable distance—the scene of his narrow escape For that day at least his appetite had been completely spoiled, for he never offered to stoop his head to the ground while daylight continued The next day his apprehensions seemed somewhat abated, but his curiosity had been excited to such a pitch that he kept pacing from place to place, never failing to halt as he passed within a moderate distance of the prostrate tree, gazing thereat in utter bewilderment, as if wholly unable to comprehend the scene he had witnessed the preceding day. After this occurrence took place I kept this favourite horse several years, and during the summer months he usually enjoyed the benefit of his old pasture. But it was quite clear that he never forgot, on any occasion, the narrow escape he had had; for neither the burning rays of the noontide summer sun, nor the furious raging of the thunder-storm, could compel Charlie to seek shelter under one of the trees that still remained standing in his small pasture."

473, 477, 502.—The Ass

(*Equus Asinus*, Linn.). It would appear, from various evidence, that the ass was domesticated at an earlier period than the horse: it was the beast of civil life, in contradistinction to the horse, which was used almost exclusively for war. In the East the ass is treated with care and attention, and there its appearance is very different from that of the serviceable but neglected and undervalued beast of western Europe. According to Chardin, "the asses of Arabia are among the finest in the world; their coat is smooth and clean; they carry their head elevated, and have fine well-formed legs, which they throw out gracefully in walking or galloping. They are used only for the saddle, and are imported in vast numbers into Persia, where they are frequently sold for four hundred livres, and being taught a kind of easy ambling pace, are richly caparisoned, and used only by the rich and luxurious nobles."

White asses are not uncommon, and appear anciently to have been selected for the use of persons of distinction (Fig. 477). In Syria there are three or four distinct breeds of asses, of which the most valued is that of Arabia.

Domesticated as the ass has been from the remotest antiquity, and valued as it has ever been in western Asia, it was long before the animal became introduced into western Europe. Aristotle states, that in his time there were no asses in Pontus, Scythia, or in the country of the Celts (modern Germany and France) · and we know that even as late as the time of Queen Elizabeth the ass was extremely rare in our country.

It is a mistake to suppose that in every part of the East the ass is large, there is a small but spirited breed in Syria, upon which the Syrian ladies are accustomed to ride, and in western India we are assured "that the asses are not much larger than good sized Newfoundland dogs They are used in droves to carry small loads of salt or grain, they are also used by the potmakers to carry their clay, and are always seen, as in Europe, associated with gypsies." ('Proceeds. Zoological Society,' 1837, p 95) It is in fact principally in western Asia, the genial climate of the ass, that it is held in esteem, and carefully bred and reared

From the accounts of travellers there would appear to be several species of wild ass, or Onager of the ancients, and the subject is altogether in confusion Bruce talks of wild asses which he saw in Abyssinia, but he is of little authority on matters of natural history. Bell, in his 'Travels in Tartary,' notices a species of wild ass resembling the ordinary kind, excepting that their hair is waved white and brown, like that of a tiger, an indefinite description, and if applicable to a species in the deserts of Tartary, naturalists are unacquainted with it There is the wild ass, or Koulan, as it is called by the Tartars, which is said to be of a uniform silvery grey, with a broad coffee coloured stripe extending down the spine, and crossed on the shoulders by a transverse band as in the domestic variety (see Fig 473). This species is regarded as the origin of the ordinary ass There is next the Ghur (Ghurkhud ?) of Persia, of which a detailed account occurs in Sir R Ker Porter's Travels (vol i), and which he describes as being ten or twelve hands high, with a sleek coat, of a reddish colour, passing on the belly and hinder parts into silvery grey the limbs were beautifully slender, "the mane was short and black, as was also a tuft which terminated his tail, but no line whatever ran along his back or crossed his shoulders' Moorcroft, in his 'Travels in the Himalayan Provinces,' describes another species under the name of the Kiang (Equus Kiang), with shorter ears than the wild ass, and which he says is certainly not the Gurkhor (Khur ?), or wild ass of Sindh. From this the Dzigguetai, or Dzigtai (Equus Hermionus, Pallas), is again distinct; and which is a native of Mongolia and the borders of Thibet and China Its general colour is Isabella yellow, passing into white on the under parts, a dark cholocate line runs along the spine.

In South Africa Le Vaillant observed, as he states, a wild ass, in large herds, of an Isabelline or pale yellow colour, which is called by the Greater Namaquas the White Zebra. If Le Vaillant be correct, this animal is unknown indeed, no traveller in Africa has seen it but himself, and Colonel Hamilton Smith suggests that he may have mistaken for this wild ass the female of the Isabelline antelope.

In the Cutch and Northern Goojrat there is a wild ass, which Colonel Sykes identifies with the Dzigguetai of southern Siberia and the Ghur of Persia, considering them as one species, and observing that all the "discrepancies of descriptions may be easily remedied by the supposition that animals examined by different individuals, at different seasons of the year, did really slightly differ owing to the difference of seasons." "The wild ass of Cutch and the north of Goojrat is not found farther south in India than Deesa on the banks of the Bunnas river, in lat. about 30° 30′, nor have I heard of it to the eastward of the 75° of longitude on the south side of the Himalaya mountains. In Cutch and Northern Goojrat it frequents the salt deserts and the open plains of Thoodpoor, Jaysulmer, and Bickaneor. By swimming the Indus it may communicate through Sindh and Baloochestand with Persia, and in Persia it evidently exists from Sir Robert Ker Porter's descriptions to the north and east Persia abuts upon the peculiar localities of the Dzigguetai, through Bucharia to the Deserts of Cobi, where it delights in the salt marshes, as it does in India, and thence to Tartary, Thibet, and South Siberia." ('Proceeds. Zool. Soc.' 1837, p. 94.)

The wild ass is common in many parts of central Asia; herds in summer are found about the lake Aral, whence they migrate southwards in winter, returning northwards in the spring. The Persians and Tartars hold its flesh in high esteem, and hunt it in preference to all other descriptions of game. It is found west of the Euphrates; "indeed we are informed by Colonel Smith," says the author of the 'Physical History of Palestine,' "that not only is the Syrian ass larger and more handsome than the Ghurkhud of Persia, but that the species improves west of the Euphrates, and is very fine in the Bahar el Abaid, Africa." "Burckhardt declares that wild asses are found in great numbers in Arabia Petræa near the gulf of Akaba. The Sherarat Arabs hunt them, and eat their flesh, but not before strangers. They sell their skins and hoofs to the pedlars of Damascus and the people of the Haouran. The hoofs furnish materials for rings, which are worn by the peasants on their thumbs, or fastened under their armpits, as amulets against rheumatism." (Notes on 'Bedouins.')

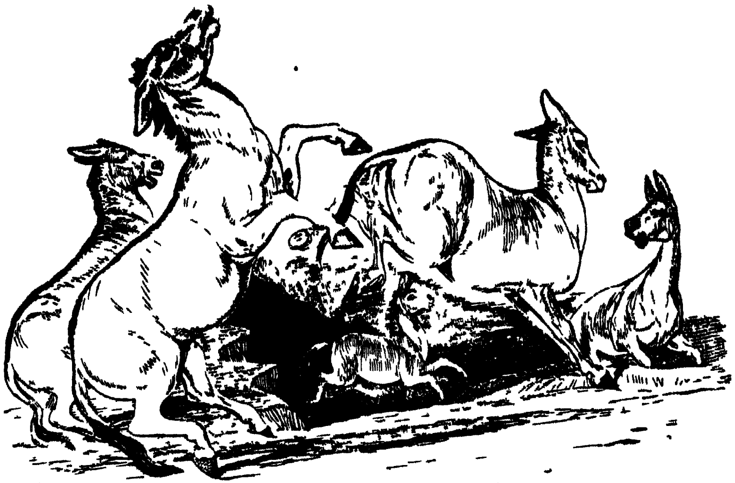
The Tartars, Arabs, and Persians are not singular in their partiality for the flesh of the wild ass. The epicures of Rome held it in the same estimation as we do venison, and from a passage in Pliny it would appear that the species inhabited North Africa, and that the most delicate and best flavoured fat foals (*lalisiones*) were brought from that continent to the Roman market. Leo Africanus also gives North Africa as the locality of the wild ass. We have quoted above our authority for stating that it exists in Arabia and in the Bahar el Abaid. We are not aware that a specimen of the true wild ass, with a cross over the shoulders, has ever been imported into Europe.

470, 471, 472.—The Dziggueтai

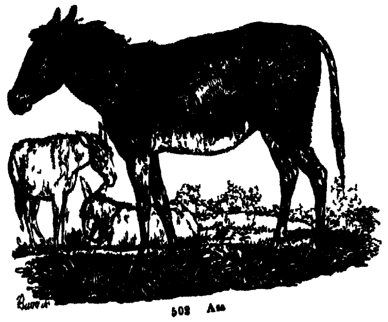
(*Equus Hermionus*). Supposing that this species be identical with the wild ass of Cutch and Goojrat, and with the Khur (or Ghurkhud) of Persia, as we have stated is the opinion of Col. Sykes, its range will be very extensive. Its fleetness is extreme. Col Sykes states that "Major Wilkins, of the cavalry of the Bombay army, who was stationed with his regiment for years at Deesa, on the borders of the Runn, or salt marshes east of Cutch, in his morning rides used to start a particular wild ass so frequently, that it became familiar to him, and he always gave chace to it, and though he piqued himself on being mounted on an exceedingly fleet Arabian horse, he never could come up with the animal." A similar statement is given by Sir R Ker Porter, of the Khur, one of which he chased in vain. "The sun was just rising over the summits of the eastern mountains when my greyhound suddenly started off in pursuit of an animal which my Persians said, from the glimpse they had of it, was an antelope. I instantly put spurs to my horse, and with my attendants gave chace After an unrelaxed gallop of three miles, we came up with the dog, who was then within a short stretch of the creature he pursued, and to my surprise, and at first vexation, I saw it to be an ass. Upon a moment's reflection, however, judging from its fleetness that it must be a wild one, a creature little known in Europe, but which the Persians prize above all other animals as an object of chace, I determined to approach as near to it as the very swift Arab I was on would carry me. But the single instant of checking my horse to consider had given our game such a head of us, that notwithstanding all our speed, we could not recover our ground on him. I however happened to be considerably before my companions when at a certain distance the animal in its turn made a pause, and allowed me to approach within pistol-shot of him he then darted off again with the quickness of thought, capering, kicking, and sporting in his flight, as if he was not blown in the least, and the chace was his pastime. When my followers of the country came up, they regretted that I had not shot the creature when he was within my aim, telling me that his flesh is one of the greatest delicacies in Persia. The prodigious swiftness and peculiar manner in which he fled across the plain coincided exactly with the description that Xenophon gives of the same animal in Arabia. But above all it reminded me of the striking portrait drawn by the author of the Book of Job. I was informed by the Mehmendar, who had been in the desert when making a pilgrimage to the shrine of Ali, that the wild ass of Irak Arabi differs in nothing from the one I had just seen. He had observed them often for a short time in the possession of the Arabs, who told him the creature was perfectly untameable. A few days after this discussion, we saw another of these animals, and, pursuing it determinedly, had the good fortune to kill it."

The Dzigguetai lives in troops under the conduct of a leader whose motions the rest follow. Ever quick and watchful, they take the alarm on the least appearance of danger, and on the approach of the enemy skim the desert, clear hills and rocks, and bid defiance to pursuit. It is easy to conceive the difficulties attending the chace of this fleet and wary animal; indeed without the aid of fire-arms pursuit would be in vain

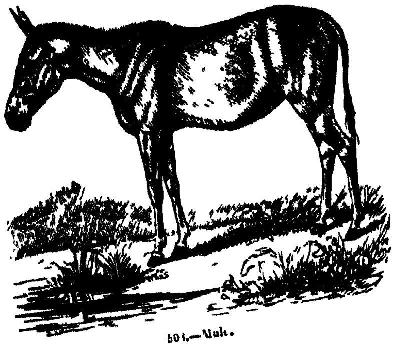
470 —Dzigguetai



472 —Dzigguetai

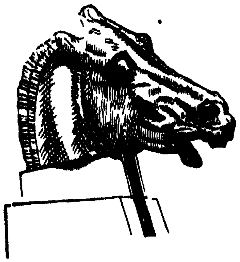


502 Ass

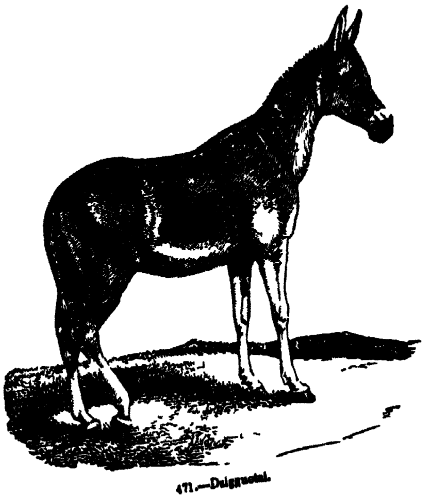


504.—Mule.

505 —Mules



469.—Horse's Head

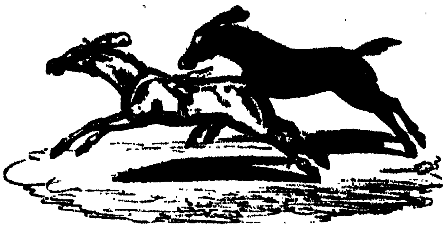


471.—Dzigguetai.

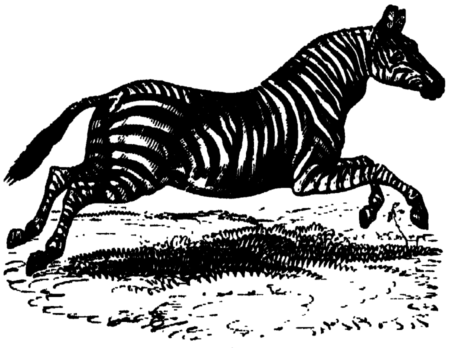
[illegible]—Wild Ass.

507 —Mule.

477.—Asses.

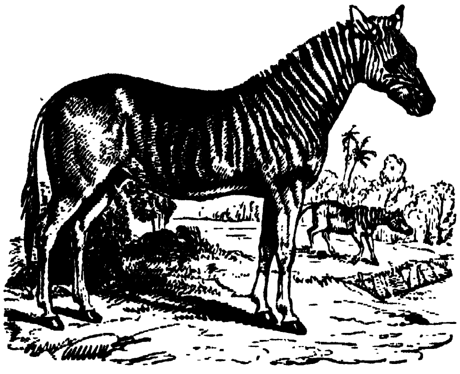


506.—Italian Horse I

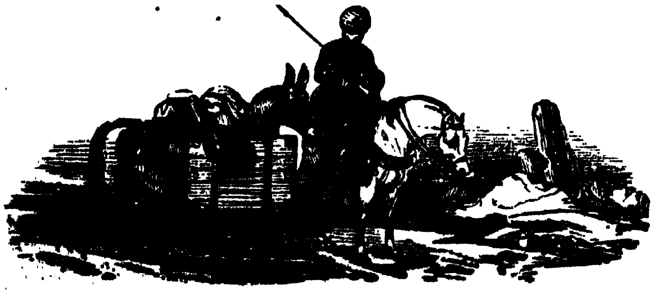


479.—Zebra.

478.—Mule.



480.—Quagga.



474.—Mule

476.—Mule.

With all its attractions, this spirited beautiful creature has never been brought into the service of man. It is indeed extremely vicious, and uses its heels on the most trifling occasion, kicking violently, and for a considerable time together, rendering it dangerous for a person to venture near it. Yet it appears that in India it has occasionally been tamed, and M. Dussumier states, "a European resident at Cutch had a dziggueta which was accustomed to follow him in his rides. One day, having ended his ride at a large sheet of water, he went on board a boat; the animal remained for some time, at first quiet on the shore, but becoming impatient on finding that the boat did not soon return, he took to the water, and swimming, came up with it and followed it to the end of the excursion."

If the dziggnetai of southern Siberia and Tartary, the wild ass of Cutch, and the ghur of Persia and Tartary, be one species, as we believe—in what, we would ask, does this animal differ from the wild ass of Tartary and other parts, called (as Desmarest expresses himself) Koulan or Choulan by the Kalmucs? Every detail, as far as we can make out, which applies to one, applies to the other also; and as it respects colour, we know well that the dzigguetai itself, as naturalists must admit, varies in tint, and the breadth and intensity of the dorsal stripe. We may here add, that one of the dzigguetais in the gardens of the Zool. Soc. was certainly brought from Cutch; and another, presented by Capt. Glasspoole, R.N., was most probably brought from the same country, or from Sindh or Persia, along the coasts of which three states he sailed in pursuance of his maritime duties.

474, 475, 476, 478, 503.—The Mule.

The mule is the offspring of the male ass and mare; the offspring of the horse and female ass is termed the hinny, and is a small inferior animal of little value. The mule in general has the form of the ass, in some respects modified, and on a larger scale, but the head and tail approach nearer to those of the horse. We learn that the mule was bred in ancient times; it is noticed in the reign of David, when it appears to have been in common use for the saddle, and consequently must have been known much earlier. The first mention of mules is in Genesis xxxiv. 24; but the true meaning of the word thus rendered is doubtful. Bochart is of opinion that the word (yemin) really denotes a gigantic people, and this opinion has the sanction of the Samaritan text and version; while the Syriac renders the word as "waters," in which meaning St. Jerome, Gesenius, and others concur.

At the present day there are various breeds of mules in Syria, and very beautiful animals are produced between high-blood Arab mares and well selected male asses. (Fig. 476.) In Europe the Spanish mule is deservedly celebrated, as is also the Spanish ass.

In Spain the muleteer is the general medium of traffic, and the legitimate traverser of the land, crossing the Peninsula from the Pyrenees and the Asturias to the Alpuxarias, the Serrania de Ronda, and even to the gates of Gibraltar. He lives frugally and hardily: his alforjas of coarse cloth hold his scanty stock of provisions; a leathern bottle, hanging at his saddle-bow, contains wine or water, for a supply across barren mountains and thirsty plains. A mule-cloth spread upon the ground is his bed at night, and his packsaddle is his pillow. His low but clean-limbed and sinewy form betokens strength; his complexion is dark and sunburnt; his eye resolute, but quiet in its expression, except when kindled by sudden emotion; his demeanour is frank, manly, and courteous, and he never passes you without a grave salutation—"Dios guarde à usted!" "Va usted con Dios, Caballero!" "God guard you! God be with you, Cavalier!"—*Washington Irving*. (Figs. 505, 507.)

We once saw four white Spanish mules of large size and admirable symmetry.

In all mountain countries, the mule, from its sureness of foot, its instinctive caution in choosing the path, and the management of its proceeding in descending a perilous and steep track, is eminently serviceable. It is employed in the Andes, where it has superseded the Llama.

The mule does not breed with the mule, but has occasionally been known to breed with the mare; and an instance occurred in the gardens of the Zool. Soc., of a mare producing a foal, of which the male parent was a hybrid between the zebra and the ass.

The use of the mule in Spain, Portugal, Italy, and also in the countries of the East, is too well known, and has been too often described by travellers, to need our enlarging upon it. Next to the horse it is our most valuable beast of burden, and in some situations far preferable. In England, however, it is not in request, nor is any care taken in the acquisition of a fine race; yet its hardiness, strength, and power of enduring fatigue are great recommendations in its favour.

The word mule, observes Mr. Bell, "is doubtless derived from μόλος, *labour*; from whence the Latin *mulus*, which affords the Italian *mulo*, the French *mulet*, and our *mule*. It was formerly called Moyle and Moil; and this word is still employed both in the southern counties of England and in Scotland to signify labour. Thus Burns, in his exquisite 'Cotter's Saturday-night'—

> "The toil-worn cotter frae his labour goes:
> This night his weekly moil is at an end."

He adds—"Mr. Yarrell informs me that in Cornwall the word moyle signifies barren: this is a very remarkable coincidence; and, after all, may probably be the etymology of the last-mentioned name of our animal." A mule may be produced between the zebra and the mare, or the quagga and the mare.

"Some years since the Earl of Moreton, being desirous of obtaining a breed between the horse and the quagga (Burchell's zebra?), selected a young mare of seven-eighths Arabian blood, and a fine male of the latter species; the produce was a female hybrid. The same mare had afterwards, first a filly and next a colt, by a fine black Arabian horse. They both, strange to say, resembled the quagga in the dark line along the back, the stripes across the forehead, and the bars across the legs. In the filly the mane was short, stiff, and upright, like that of the quagga. In the colt it was long, but so stiff as to arch upwards, and hang clear of the sides of the neck; in other respects they were nearly Arabian, as might have been expected from fifteen-sixteenths Arabian blood."

To the physiologist this circumstance opens an interesting subject for investigation, nor is the fact unimportant to the breeders of animals, inasmuch as it incontestably proves that the characters of the male parent of the mother's first progeny exert a marked influence on her subsequent offspring, whatever may be the peculiarities of the father of the latter.

479, 508.—The Zebra

(*Equus Zebra; Equus montanus*, Burchell). This beautiful animal is a native of the mountain districts of southern Africa, and is found, according to various writers, in Congo, Guinea, and even Abyssinia, according to Ludolphe. Bruce, however, states that "the zebra is found nowhere in Abyssinia, except in the south-west extremity of Kuora, amid the Shangalla and Galla, in Narea and Caff, and in the mountains of Dyre and Tegla, and thence to the southward." It is called in South Africa Wilde Paarde by the Cape colonists.

The zebra is regularly striped, even down to the hoofs, with glossy brownish black on a white or yellowish white ground. The ears are long, the neck short and deep, with a sort of dewlap under the throat produced by a loose fold of the skin; the mane is short, and the tail sparely clad with long hair.

Wild and swift, this species lives in troops in the bold ranges of craggy mountains remote from the abodes of man. Its disposition is savage and intractable, and it is by no means easily obtained, not only from its fleetness, but from the nature of the locality it frequents, where, like the wild ass of Tartary, in "the wilderness and the barren land is his dwelling; he scorneth the multitude of the city."

Two mules in the gardens of the Zool. Soc. are between the male zebra and the common ass. They are strong, and work well.

481.—Burchell's Zebra

(*Equus Burchellii*), the Dauw of the colonists of South Africa. This species is a tenant of the plains, and is found occurring in every district north of the Orange river, as far as travellers have penetrated. It dwells in troops, which make occasional migrations from the interior to the more fertile districts in search of food. At irregular and uncertain intervals there occur seasons of drought in South Africa, when the pools of the desert are dried up, and the surface of the wilderness is parched. Driven from their native solitudes by the desolation around them, zebras, antelopes, and other animals in incredible multitudes pour like a torrent over the cultivated districts, destroying the pasturage and the corn; with the return of the rain they retrace their steps and seek their desert fastnesses. Burchell's zebra is strong and muscular, with sinewy limbs, and might perhaps be made serviceable to man. It is an animal that admits of being tamed to a certain extent with facility, and occasionally a half-domesticated specimen is exposed for sale at Cape Town with a rider on its back. The persons, however, who have had most opportunities of becoming acquainted with its character, regard it, tractable as it may sometimes appear, as treacherous, fickle, vicious, and obstinate. It is a remarkable fact that this species, and the quagga also, are often seen in company with the ostrich: several of the latter feeding tranquilly in the midst of a herd, without experiencing any molestation.

This species may be distinguished from its mountain relative by the shortness of its ears, by the absence of stripes on the limbs and under surface of the body, and by the stripes of the upper parts being brown.

These animals present a brilliant appearance when flying in troops before the hunter. Their flesh (with that of the zebra and quagga) is relished by the natives, but Mr. Burchell thought it not much superior to horseflesh, and he would, with most Europeans, think the same respecting the flesh of the wild ass, which in Persia is in the highest estimation, and served at royal banquets. The drawing (*Fig.* 481) *represents the spearing of one of these* animals by a mounted Caffre.

480.—The Quagga

(*Equus Quagga*). Like the preceding species, the Quagga is a native of the plain, and occurs south of the Orange river, within the limits of the Cape Colony. It roams in large herds, as does Burchell's zebra, but the herds of the two animals never mingle together, nor are the two species known to produce a mixed progeny.

The quagga is far inferior to Burchell's zebra both in size and beauty; its ground colour is a dull brownish white, clouded and striped with a darker colour on the head, neck, and withers, and less distinctly on the sides of the body; the haunches are greyish; the under parts, tail, and legs white. In its temper the quagga is wild and vicious; nevertheless it is said to be sometimes employed by the natives for the purposes of draught.

We have already stated that fossil relics of animals of the genus Equus are abundant, and very widely dispersed. They occur in the third period of the tertiary series (Pliocene of Lyell), in the fresh-water deposits in what is called diluvial detritus, in superficial gravels, sands, and clays in the ossiferous caverns, in the osseous breccia, and in the Eppelsheim sand, &c. Captain Cautley found bones of the horse (but not in abundance) among other fossil remains lying on the slopes among the ruins of the fallen cliffs, and also *in situ* in the sandstone of the Sewalik Mountains, at the southern foot of the Himalayas, between the Sutlej and the Ganges.

Several species of Equus have been recorded, as Equus fossilis (E. Adamiticus, Schlotheim), Equus (Caballus) primigenius; Equus (Mulus) primigenius; Equus (Asinus) primigenius. It is very probable that these recorded species may be really distinct from each other, yet it is by no means certain, for it would appear that it is rather upon size than any definite and persistent characters that the distinctions are founded. Indeed the bones of the living species do not afford any certain data by which to discriminate one from another. Cuvier informs us that he had carefully compared the skeletons of many varieties of horses, those of the mule, of the ass, the zebra, and the quagga, and that he could never find a character sufficiently fixed to enable him to pronounce on a species from an isolated bone. Size, he observes, furnishes but incomplete marks of distinction. Horses and asses vary much in this respect from their states of domestication; and he adds that though he had not yet procured the skeleton of a dzigguetai, he doubted not its resemblance to the other species as much as they resemble each other in the same particular. To distinguish the skeleton, or a few bones of the skeleton, of the zebra, from those of Burchell's zebra, or the quagga, or the dzigguetai, is indeed difficult; but still where the relics indicate great difference of size to have existed, taking into account the circumstance that the extinct Equi were wild, and therefore unmodified by the influence of domestication, there are good grounds, from difference of size alone, for assuming specific distinctions. With regard to the probability that to some of these extinct wild species is to be attributed the origin of our domestic races, we have already expressed our opinion.

482.—Skull of the Fossil Adapis.

To the order Pachydermata Cuvier refers an extinct animal, of which the remains have been found in the plaster-quarries of Montmartre. The remains, however, are very rare, and we believe that only three fragments of skulls have been recovered. The adapis was evidently a small animal, its skull being only about a third larger than that of a hedgehog. There were four incisors, sharp-edged and oblique, in each jaw, followed by a canine tooth of a conical form and not exceeding the molars in length. Of these latter there were seven on each side, in each jaw. In the upper jaw the first molar was trenchant, the second and third surrounded by a small ridge, the last four flat-crowned. In the lower jaw the first three molars were pointed and trenchant, the remainder flat-crowned and tuberculous, like those above opposed to them. Of the general outline of the adapis we have as yet no means of arriving at any idea.

483, 485.—The Dinotherium (*D. giganteum*), as restored by Professor Kaup. Cuvier, from teeth and isolated fragments, gave, in his work on fossil bones, the title of "Tapir gigantesque" to the huge animal of which they were the relics, the only ones then discovered. It was reserved for Professor Kaup to add to our knowledge of the animal in question, by the discovery first of several lower jaws (Fig 487), and subsequently of the skull (Fig. 486), which were found imbedded in a stratum of sandstone (the second or Miocene system of tertiary deposits), at Eppelsheim, about twelve miles south of Mayence, in company with relics of the following, viz.: a second species of Dinotherium, making the species 2 · Tapirus, 2, larger than living species; Chalicotherium (allied to Tapirs), 2; Rhinoceros, 2; Tetracaulodon (allied to Mastodon), 1; Hippotherium (allied to Horse), 1; Sus, 3, Felis (some as large as a Lion), 4; Machairodus (allied to Bear, Ursus cultridens). Gulo (Glutton), 1; Agnotherium (allied to Dog, but as large as a Lion), 1.

Cuvier, before he had completed the last edition of his 'Règne Animal,' became aware of M Kaup's discovery of the lower jaw, and in his Additions, vol. i. p. 581, he alludes to this fragment as affording data for the separation of the "Tapir gigantesque" into a distinct genus. To this genus M. Kaup has given the title Dinotherium. The skull of this extraordinary animal is more than a yard in length, and the size and situation of the nasal orifice (Fig. 484), with the salient portion of the short nasal bones, indicate the probable possession of a proboscis; we say probable, because in the Manatee or Lamantin, and also the Duyong, we have a similar extent and situation of the nasal orifice, a circumstance militating against the inference that a proboscis necessarily accompanies this conformation of the skull. Indeed the general aspect of the skull of the Dinotherium, setting aside the tusks of the lower jaw, and its strange alveolar projection, strongly reminds us of that of the Lamantin (Manatus, Cuv.). The orbits themselves are very small, but the temporal fossæ are very deep and extensive, indicating the great mass of the temporal muscle The lower jaw is most remarkable It is armed at the extremity with two enormous tusks (incisors), which, instead of projecting upwards or forwards, sweep downwards, and curve gently backwards, having their roots imbedded in enormous alveoli. The dentition is as follows:—Incisors $\frac{0}{2}$, Canines $\frac{0-0}{0-0}$, Molars, $\frac{5-5}{5-5}=22$. Of the molars the third has three transverse ridges across its surface, the others have two, with the exception of the first molar of the lower jaw, which has only one at its posterior part, the anterior portion being trenchant. Fig. 488 represents the palatal view of the skull of the Dinotherium Fig 490, the molar teeth and the relative bearing of the two rows, which approximate towards each other anteriorly.

The situation and affinities of the Dinotherium have been the subject of much speculation, and very opposite opinions have been entertained by different naturalists. M Kaup, influenced by the discovery of huge claws and a scapula, resembling in character those of the Pangolins (Manis), assigns the animal to the Edentata, but differing from all extant species not only in exceeding the elephant in size, but in having, like the elephant, a proboscis Dr Buckland regards the Dinotherium as approximating to the tapir, of aquatic habits, and furnished with a proboscis, by means of which it conveyed to the mouth the vegetables raked from the bottom of lakes and rivers by its tusks and claws, and he alludes to its claw resembling that of the Pangolins MM. Blainville and Dumeril consider the Dinotherium to have been allied to the Lamantins, or "aquatic gravigrades,"—to have been in fact a Duyong with tusk-incisors, and therefore one of the concluding forms of the Pachydermata. They consider that it had no proboscis, but a huge inflated muzzle and upper lip. Gæger places it with the seals. Now as regards M. Kaup's theory, we may at once state that the claws and scapula on which he founds it are not proved to belong to the Dinotherium; and he himself admits that should the discovery take place of other fossil relics whence the certain existence of a Manis gigantea might be presumed, his theory would be overthrown. Our own opinion coincides with that of M. Blainville. The occipital condyles (see the posterior view of the skull see from below, Fig. 489, and the skull, Fig. 486) are terminal, or in the direction of the longitudinal axis of the skull, as in Lamantins, and also the Cetacea Mammalia modified for aquatic existence. The occipital surface is large, subvertical, and even inclined from before backwards, with a profound mesial depression for the insertion either of a very strong cervical ligament or powerful muscles for the elevation of the head. The basilary portion of the skull (Figs. 488, 489) is narrow in its component parts, while the vertical surface (Fig. 486) is, as in the Lamantins and Duyongs, very wide, overplumbing the temporal fossæ, of which the depth and width indicate the enormous levator muscles of the lower jaw, not only for the purpose of mastication, but for the particular action of the lower jaw, with its rake-like tusks. Moreover, in the lower jaw we find an analogy to that of the Duyong, of which the branches curve downwards for a third of their length to a deflected symphysis, only that in the Dinotherium this downward curvature is carried to a far greater extreme, for the implantation of tusk-incisors. What were the limbs of this gigantic animal? If its habits were terrestrial, which a consideration of the skull forbids us to believe, the Dinotherium must have had solid pillars of support, like the limbs of the elephant, and destitute of that liberty which even in the Pangolins they are endowed with; but, if our ideas are correct, its limbs were adapted for aquatic locomotion, and perhaps the posterior pair were wanting, or formed the elements of a terminal paddle. Its diet was undoubtedly vegetable, as in the Duyong, and we may conceive it tearing up the strong-fibred vegetables from their subaquatic bed by means of its tusks, which might serve also as weapons of offence, or as anchors for the purpose of mooring itself to the banks of the lake or river, or of dragging its unwieldy body partially out of the water.

Dr. Buckland informs us that bones of the Dinotherium have lately been found in tertiary fresh-water limestone near Orthes, at the foot of the Pyrenees, and with them remains of a new genus allied to rhinoceros, of several unknown species of deer, and of a dog or wolf equalling a lion in size

Cuvier and Kaup calculate the length of the Dinotherium at about eighteen feet, the massive lower jaw measures nearly four feet, exclusive of the tusks

491, 492.—Fossil Skull of Toxodon (*Toxodon Platensis*, Owen). We are inclined to refer the Toxodon, of which an imperfect skull and fragments of a lower jaw, and some teeth, are our only guides, to the aquatic Pachyderms, and, as in the instance of the Dinotherium, we draw our deductions from the weight of the skull, from the form and position of the nasal aperture, the slope of the occiput, and the position of the occipital condyles

The skull in question was brought by Mr Darwin from South America. It appears that during his sojourn in Banda Oriental he heard of some giant's bones at a farm house on the Sarandis, a small stream entering the Rio Negro, about 120 miles north-west of Monte Video. Accordingly there he rode, and for the sum of eighteen-pence purchased the cranium now in the museum of the Royal College of Surgeons, London. Mr. Darwin was informed by the people at the farm-house that the relics were exposed in consequence of a flood having washed down part of the bank of earth When first found the skull was perfect, but unfortunately the boys of the neighbourhood knocked out the teeth with stones and set up the head as a mark to throw at. Mr. Darwin, however, found a perfect tooth, and fragments ascertained by Professor Owen to be those of the lower jaw. These remains were so fresh as to render it difficult to believe that ages had passed since their interment, and Mr. Darwin observes that they contained so much animal matter, that when a portion was heated in the flame of a spirit-lamp, it not only exhaled a very strong animal odour but burnt with a slight flame. The deposit in which they were imbedded was a whitish argillaceous earth, forming the banks of the Sarandis, overlying a granitic foundation.

The skull in question equals in size that of the hippopotamus, measuring two feet four inches in length, and one foot four inches in extreme breadth. The form of the skull (Figs. 491, 492) is elongated and depressed, the zygomatic arches are of enormous size and strength, an index of the great volume of the temporal and masseter muscles. The occipital region (Fig 493) slopes from the condyles upwards and forwards. The maxillary portion of the skull is compressed laterally, narrow across, and with large intermaxillary bones, slightly dilated at their extremity. The superior part of the skull was cavernous, with cells, or sinuses, giving to it greater apparent volume than the cerebral cavity would lead us to infer: we have already alluded to the deceptive volume of the skull of the elephant. According to Professor Owen the dental formula is as follows:—Incisors $\frac{4}{6}$, canines none, a vacant space being in their place; molars $\frac{7-7}{7-7}=38$. The incisor teeth (see Fig. 496, the fragment of the anterior part of the lower jaw, with the teeth *in situ*; and Fig. 495, an incisor of the lower jaw) are remarkable for their resemblance in many respects to those of the Rodents: they were rootless, and had persistent pulps; growing, therefore, as worn down by use. In the upper jaw the two central incisors were very small; the two external ones very large, curved, with their sockets extending back in an arched direction through the intermaxillary bones to the maxillary, and terminating, without becoming contracted, immediately anterior to the grinding teeth. In the lower jaw the two middle incisors are largest, the rest gradually diminishing in size. (Fig. 496) The molar teeth also were rootless, and curved, whence the name Toxodon (τοξον, a bow, ὀδούς, a tooth), and their grinding surface presented one or more folds of enamel re-entering the osseous substance of the centre, as in Rodents See Fig 494, the last molar teeth but one of upper jaw; Fig 497, the grinding surface of the same, Fig. 498, the grinding surface of the corresponding molar of lower jaw

We might here enter on many minutiæ, and follow Professor Owen through his anatomical details, were it not that they are rather adapted for the close attention of the comparative anatomist than the general reader. Those who wish to gain the fullest information on these points we may refer to the 'Proceeds. Geol. Soc. Lond' 1837, and the 'Zoology of the Beagle: Fossil Mammalia' We may observe, however, that "in the aspect of the plane of the occipital foramen and occipital region of the skull, in the form and position of the occipital condyles, in the aspect of the plane of the bony aperture of the nostrils, and in the thickness and texture of the osseous parietes of the skull,' the Toxodon manifests an affinity to the Dinotherium and the aquatic Pachyderms (the herbivorous Cetacea of Cuvier, but which in manners and organization have little relationship to the true whales, excepting as far as they are all modified for the waters of the deep).

With respect to the limbs of the Toxodon, we have as yet no evidence respecting their form or number; how far, therefore, they were constructed for aquatic progression, whether for this solely, or for occasional visits to the land, is yet a problem to be solved. Professor Owen, however, suggests that the presence of large frontal sinuses renders it not improbable that the habits of this species were not so strictly aquatic as the total absence of hinder extremities would necessitate.

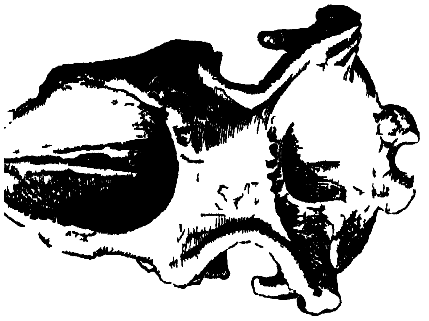
In speaking of the Dinotherium and Toxodon it will be seen that we have referred them, with the Lamantins and Duyongs (often written Dugongs), to the aquatic Pachyderms, between which group and the ordinary Pachyderms we regard the hippopotamus as forming a link, though decidedly within the pale of the latter Cuvier has remarked that such of the Pachydermata as approach the Ruminants in the structure of their feet partake in some degree of the complication of the stomach which in the animals of the latter order is so remarkable a character, and it may be said, *per contra*, that such Pachyderms as approach in a certain degree in habits to the aquatic group resemble them in the structure of the same organ The stomach of the semi-aquatic hippopotamus, for example, consists of certain sacculi, which renders it analogous to that of the lamantin Sir E Home observes that "the stomachs of the manatee and hippopotamus bear a close resemblance to each other in structure, and are in many respects similar to that of the peccary, which is a variation of the hogs, to which the tapir is also allied, and these circumstances throw no small light upon the preparatory processes required for the digestion of different kinds of vegetable food The grass of the field is the food of Ruminating animals and, from the structure of their digestive organs, it is evident that much previous digestion is necessary for its preparation. The grass and weeds at the bottom and on the banks of rivers is the food of the manatee and hippopotamus, and the apparatus formed for preparing these substances displays an approach to the stomachs in Ruminants In the hog tribe the resemblance is less, those animals having a more indiscriminate diet: the structure of their stomach shows that grass is by no means their natural food The stomachs of the manatee and hippopotamus, then, which at first sight appear so extraordinary and incomprehensible, are in fact the links which unite the Ruminants to those animals which feed on roots and various vegetable substances, and form a key, without which the different gradations cannot be satisfactorily explained"

It is not only in the form of the stomach, but in the structure and contour of the skull, the position of the eyes and nostrils, and even in the nature of the skin, with its subcutaneous layer of fat, that we trace the approximation of the hippopotamus to the Lamantins; and it may be that the Toxodon, and even Dinotherium, form links between the Lamantins and hippopotamus, being within the pale of the group to which the former belong.

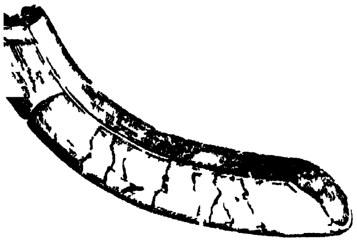
We may here observe, that the number of fossil

4 3.—Dinotherium.

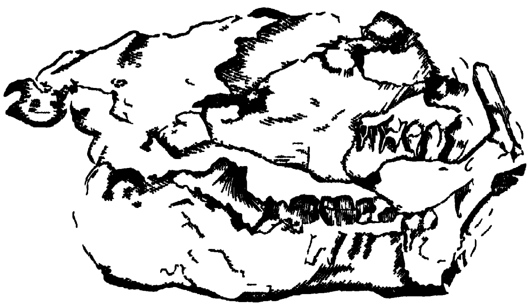
8.—Burchell's Zebra.



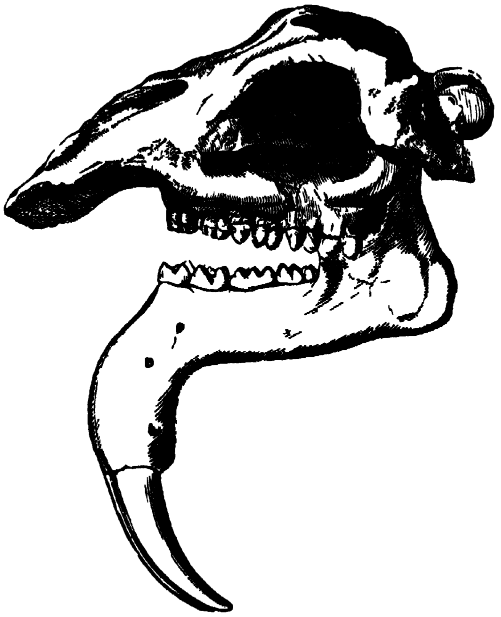
484.—Skull of Dinotherium.



485.—Incisor of Lower Jaw of Toxodon.

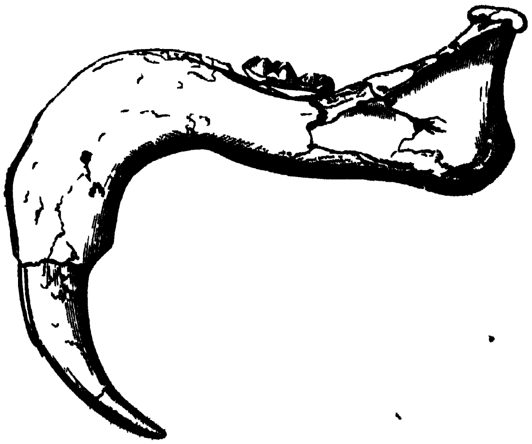


4 2.—Skull of Fossil [illegible]



486.—Skull of Dinotherium.

488.—Dinotherium.



487.—Lower Jaw of Dinotherium.

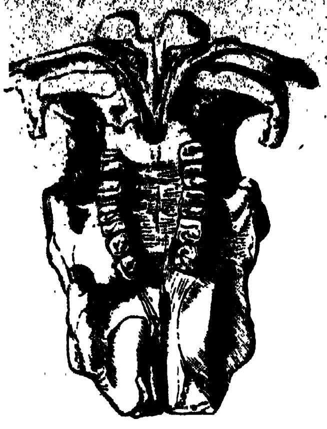


Fig. 488

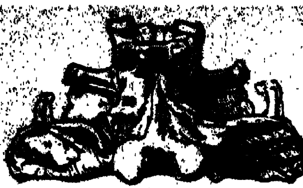


Fig. 489.

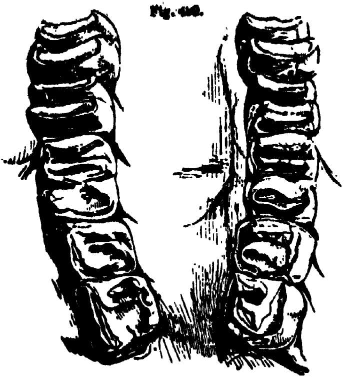


Fig. 490.

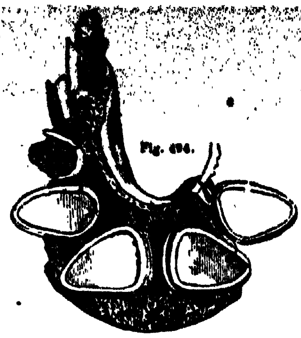


Fig. 496.

Fig. 498.

Fig. 497.

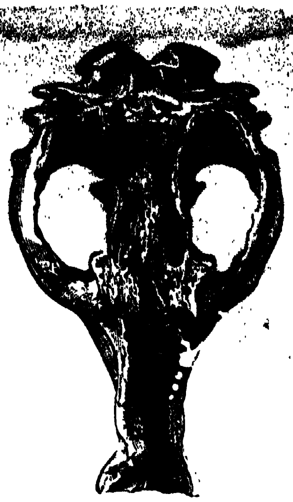
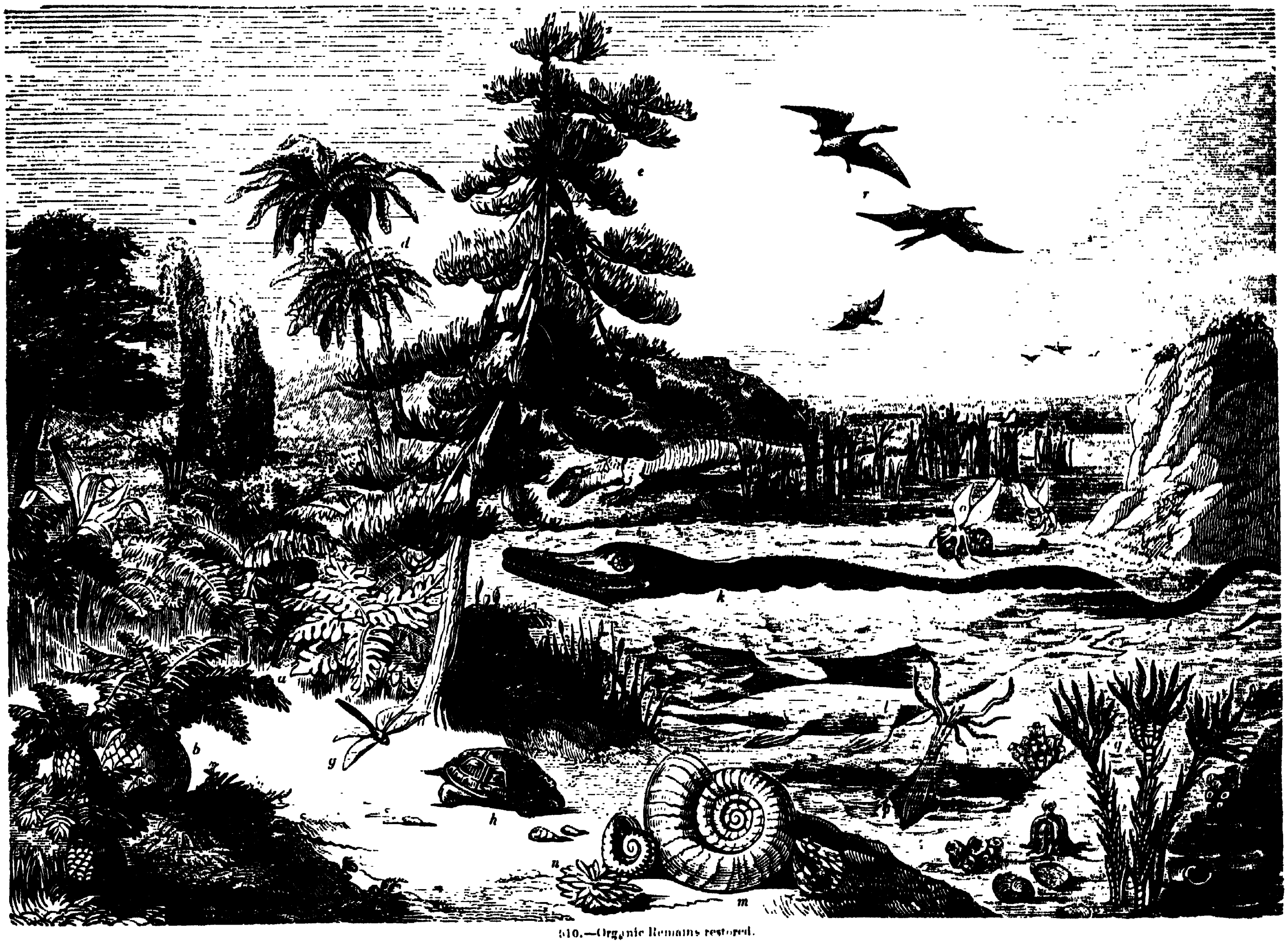


Fig. 491.



510.—Organic Remains restored.

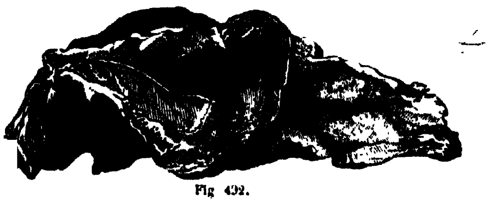


Fig. 492.

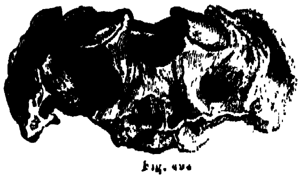


Fig. 494.

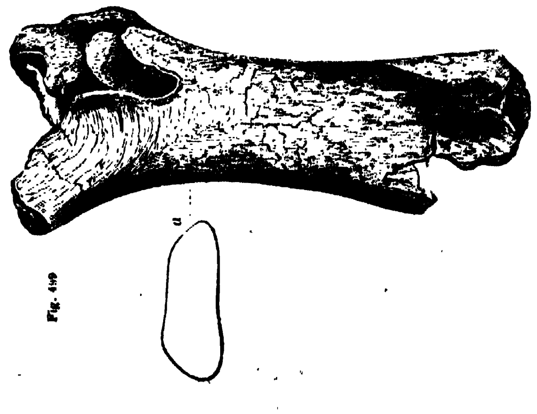


Fig. 499

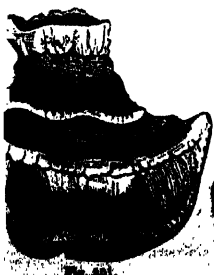


Fig. 501.

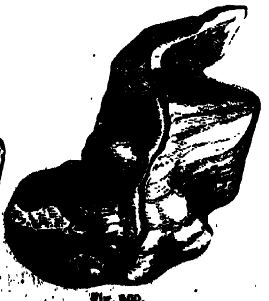


Fig. 500.

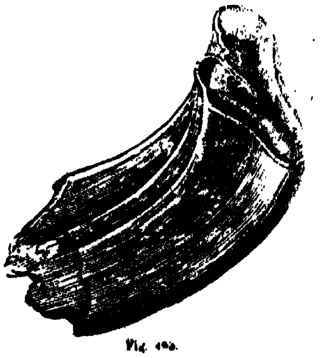


Fig. 495.

genera included within the Pachydermata greatly exceeds that of genera containing living species, of which latter many, as Equus, Elephas, Rhinoceros, and Hippopotamus, have fossil as well as living species: so that the number of fossil or extinct species already ascertained of the Pachydermatous order, taken collectively, is far greater than the number of living species. In some, perhaps many, instances the affinities of the fossil Pachyderms are not understood, fragments of bones only having been recovered. in some instances they cannot be mistaken.

We began our observation on the Pachydermata by alluding to the unfilled intervals between the forms now living on the surface of the earth, and a statement that in fossil forms—some yet to be discovered, others to be made out, and, as it were, re constructed—would the lost links in the chain be recovered; and we again express our opinion that ultimately the work will be, if not perfectly, at least to a great extent, accomplished.

That our ideas are not unreasonable we have from time to time satisfactory proofs Sir Thomas Mitchell has recently transmitted from Australia some fossil bones which incontestably prove the existence of at least one gigantic Pachyderm, at some remote period, in that region These fossils consist of a portion of a molar tooth, of the shaft of a thigh bone, with part of the spine, of a scapula, and some smaller fragments of a long bone They were found on the Darling Downs, those extensive plains marked to the south west of Moreton Bay on most maps of Australia, at the source of the river Darling, and upwards of 1000 feet above the level of the sea Sir Thomas Mitchell, in his letter to Professor Owen, to whom the relics were forwarded, states that these huge bones are found in some abundance It would appear from Professor Owen's examination, that this huge extinct animal was allied both to the Mastodon and Dinotherium. Fig 499 represents the femur of this extinct Australian Pachyderm *a*, its transverse section. Figs 500 501, two views of the portion of a molar tooth of the same These fossils now in the Museum of the Royal College of Surgeons cannot, observes Professor Owen be contemplated without suggesting many interesting reflections

"They tell us plainly that the time was when Australia's arid plains were trodden by the hoofs of heavy Pachyderms, but could the land then have been, as now, parched by long continued droughts, with dry river-courses, containing here and there a pond of water? All the facts and analogies which throw light on the habits of the extinct Mastodons and Dinotheres indicate these creatures to have been frequenters of marshes, swamps, or lakes Other relations of land and sea than now characterize the southern hemisphere, a different condition of the surface of the land and of the meteoric influences governing the proportion and distribution of fresh-water on that surface, may therefore be conjectured to have prevailed when huge Mastodontoid Pachyderms constituted part of the quadruped population of Australia May not the change from a humid climate to the present particularly dry one have been the cause, or chief cause, of the extinction of such Pachyderms? Was not the ancient Terra Australis, when so populated, of greater extent than the present insular continent? The mutual dependences between large mammalian quadrupeds and other members of the animal kingdom suggest other reflections in connection with the present fossil If the extinct species ever so abounded as to require its redundancy to be suppressed by a carnivorous enemy, then some destructive species of this kind must have co-existed, of larger dimensions than the extinct Dasyurus laniarius, the ancient destroyer of the now equally extinct gigantic Kangaroos, Macropus Titan, &c, whose remains were discovered in the bone-caves of Wellington Valley Extremely few coprophagous beetles have hitherto, I believe, been found in Australia; and the scarcity of such is readily explained by the absence of native species of large herbivorous mammals, but the dung of the Mastodontoid quadrupeds which formerly existed in Australia must then have afforded the requisite conditions for a greater abundance of such Coleoptera These and other speculations are naturally suggested by the highly interesting fossils here described The great importance of such organic remains will be obvious from the few inferences which have been briefly noted, our obligations to the enlightened collector and transmitter of the Mastodontoid fossils are great, and the arrival of additional facts and specimens will be most earnestly welcomed.'

A consideration of the fossil relics of extinct animals throws the mind back upon remote periods before the surface of our globe had acquired its present aspect, its present arrangement of land and water, of mountains and plains, islands and continents; and when we begin to review the history of its phases, we find ourselves carried back into the obscure of time, till—in comparison with the ages which have passed since the commencement of the Primary period, wherein those oldest rocks were formed in which there are no traces of animal or vegetable life: to the conclusion of the Secondary geological period—the date of man's existence on the globe seems but of yesterday, and the few thousand years through which he has played his part sink into a span

But though the vast antiquity of the globe is clearly demonstrated, still the length of time which has elapsed during the formation of the whole or of any definite portion of the crust of the earth is a problem yet to be solved We know that at one period life had no place on our planet. The gneiss and mica schist systems of strata of the Primary period are destitute of all trace of organic remains. In these, the most ancient of rocks, which exhibit to us the combined effects of igneous and aqueous agency, no fossil relics speak of a Fauna or Flora during their formation, and we may believe that few or none of the organised wonders of nature were then in existence, because the physical conditions of the globe requisite for the existence of animals and plants were not then established * How long did this state of the earth continue? It is a question which cannot be answered Passing from the primeval rocks,

> 'Where the bird dare not build, nor insect wing
> Flit o'er the herbless granite,

we come to the Snowdon rocks of argillaceous slate, and the calcareous and argillaceous rocks, constituting the Cumbrian system, in which a few traces of organic life have been detected, but of organic life in its lowest type Then the Silurian or transition system succeeds, consisting of sandstones, limestones, and shale, here corals, crinoidea, trilobites, terebratula, &c, all belonging to extinct species and often to extinct genera and families, and all aquatic, are abundant From these systems of the primary strata, we advance to the secondary strata—rich in oceanic life—divided into the carboniferous system, the saliferous or new red-sandstone system, the oolitic system, and the cretaceous or chalk system The deposits constituting each of these systems are replete with organic remains, but all of extinct species and often of extinct genera. The coal measures are rich in an extinct Flora, principally consisting of ferns, often in an extraordinary degree of preservation, the most delicate leaves being spread out, and so arranged as to constitute a beautiful Hortus Siccus of a long-past period About 300 species of plants have been discovered in the coal-measures of this and other countries. Their luxuriance indicates a genial temperature and a humid ground 'It would hardly be credited,' says Professor Lindley, in his 'Fossil Flora of Great Britain,' "by persons unacquainted with the evidence upon which such facts repose, that in the most dreary and desolate regions of the present day there once flourished groves of tropical plants, of Coniferæ, like the Norfolk Island and Araucarian pines, of bananas, tree-ferns, huge cacti and palms, that the marshes were filled with rush-like plants 15 or 20 feet high, and the coverts with ferns like the undergrowth of a West India island." Our engraving (Fig 510) is a restoration of some of the animals and plants characteristic of the oolitic system (lias, limestone, oolite, &c) of the secondary strata, which will serve to convey some idea of the Fauna and Flora of the period when those strata were in process of formation—a period in which strange monsters ploughed their way through waters which have given place to solid rock. Plants—*a*, Ferns (Filices) *b*, Zamia (Cycadæ). *c*, Arbor Vitæ. *d*, Dracæna *e*, Araucaria pine *f*, Equisetum—Animals—*g*, Dragon-fly. *h*, Tortoise. *j*, Megalosaurus *k*, Ichthyosaurus. *l*, Plesiosaurus *m*, Ammonites *n*, Echinus *o*, Nautilus. *p*, Cuttle-fish *q*, Encrinites *r*, Pterodactylus

The chalk system is rich in extinct corals, zoophytes and echinoderms. Our lofty chalk hills and the white cliffs of Dover have been formed through a long succession of ages at the bottom of a deep sea From the Secondary we advance to the Tertiary periods In general, says a talented writer, "No contrast can be more complete than that between the secondary and the tertiary rocks, the former retaining so much uniformity of character, even for enormous distances, as to appear like the effect of one determined sequence of general physical agencies, the latter exhibiting an almost boundless local variety, and relations to the configuration of land and sea not to be mistaken. The organic bodies of the secondary strata are obviously and completely distinct from those of the modern land and sea, but in the tertiary deposits, it is the resemblance between fossil and recent kinds of corals, shells, plants, quadrupeds, and other vertebrata, which first arrests the judgment. In general there is a decided break between the two groups of rocks, a discontinuity which is nowhere completely filled. Yet besides the pseudo-tertiary or transition chalky rocks of Maestricht and the Pyrenees, and the conchiferous marls of Gosau, we have in England and France above the chalk a prevalence of green and ferruginous sands similar to those below. Perhaps they have been derived from the waste of those older rocks. Mr. Lyell supposes the tertiaries of the London basin to have been formed from the waste of the secondary strata of Kent, Surrey, Sussex, and Hampshire. With the tertiary system came into existence, if we may trust the evidence which the earlier strata present, many races of quadrupeds, some birds, reptiles and fishes, extremely analogous to, though for the most part specifically distinct from, the modern denizens of land and water, thousands of corals, shells, crustacea, &c which present with living races quite as great analogy as obtains between the tribes of the Atlantic and the Pacific oceans of our day. The general features of land and sea as they now exist began to appear, and there can be no doubt that in a philosophical study of the revolutions of the globe the tertiary era of geology cannot be properly separated from the existing system of nature" The tertiary period, taken in this extended sense, saw the creation and extinction of the mammoth, the mastodon, the palæotherium, the fossil rhinoceros and hippopotamus, the dinotherium, the toxodon, and the huge pachyderm of Australia and next, the creation of all our modern races of animals

During the period of the deposition of the tertiary strata, the relations of land and sea were greatly altered in various portions of the globe, in Europe by the rising of the Pyrenees beyond the height they reached after the cretaceous era, and by the uplifting of the Alps from the Mediterranean towards Mont Blanc "In England we may believe the upward movement of the southern counties connected with the Hampshire axis of elevation, and the Isle of Wight convulsion was ended at an early epoch of the tertiary period The eastern range of the Alps from Mont Blanc to Vienna is of later date, and may be viewed as the most marked phenomenon of elevation which accompanied or preceded the dispersion of erratic blocks in Europe"

Besides the alterations thus produced in the relation of the land and the sea, changes have taken place, and are still in progress, from other causes. Rivers bring down vast quantities of the disintegrated particles of the strata through which they flow, and deposit the sediment at their mouths, forming deltas, or low tracts, won as it were particle by particle from the domain of the ocean, on the other hand, the sea itself wears down coasts to a great extent, making vast inroads on the land, and converting the isthmus into an island sometimes, by the sudden or gradual elevation of a large tract of land, an inland sea becomes drained, leaving in its place a sandy desert In the depths themselves there is no rest, multitudes of zoophytes and testacea there live and die, there their remains accumulate layer upon layer, forming beds of vast thickness, which at a future day may be laid bare, covered with alluvium, and engage the researches of another Cuvier. The chemical action of the atmosphere; heat and cold, rain and snow, winds, springs, rivers, torrents, the action of the tides, life, animal and vegetable, and volcanic agencies, all contribute their part to alter the surface of the land, and to effect changes in its relative extent to that of the sea, changes which are in reality never stationary, but, imperceptible as they may seem, in constant progress

The deposits of the tertiary period are divided by Mr Lyell into three series. the oldest, or Eocene, in which there occurs from three to five per cent. of existing species of shells; secondly, the series of the middle age, or Meiocene, averaging 18 per cent. in the occurrence of existing species of shells, and thirdly, the superficial or Pleiocene deposits, in which the ratio of existing shells is from 40 to 95 per cent.

We trust we shall be pardoned for this brief digression, into which we were led by a desire to show that fossil relics are not all of the same era, and that Primary, Secondary, and Tertiary periods have each their distinguishing characteristics, their own fossil relics, that on the whole the progression of life has been from the lowest aquatic forms, to forms analogous to those now tenanting the earth, which when they existed in the Eocene, Meiocene, or Pleiocene epoch of the Tertiary period, must have presented to a certain extent the superficial features it at present exhibits, though there were doubtless great modifications in the arrangements of land and water, and in the temperature of given latitudes We beg to refer our readers to the articles 'Organic Remains' and 'Geology,' in the 'Penny Cyclopædia.' The perusal will give additional interest to our details of fossil relics.

---

* We exclude microscopic animalcules from our consideration, because at present we scarcely know under what circumstances they can live.

ORDER RUMINANTIA.

This order, termed Pecora by Linnæus, is one of the most natural of the primary groups into which the Mammalia are divided. It contains all those quadrupeds in which a cloven hoof, the act of rumination (chewing the cud), and the absence of incisors in the upper jaw coexist together as data upon which to draw a line between them and all other Mammals. It is true that the Camelidæ, or camel tribe, including the Llamas, exhibit in their dentition a departure from the rule, and exhibit, both in this particular and in osteological structure, some approximation to the Pachyderms; nevertheless even the Camels, in common with the Ruminants generally, partake of those definite structural peculiarities from which there is no deviation, and which constitute a common bond of union.

A rapid glance at the distinguishing characteristics of this order will not, we trust, be unacceptable; certainly it is not out of place. Decidedly herbivorous, with lips modified either for browsing, as the camel, giraffe, &c., or for grazing, as in the ox, the Ruminantia are accordingly furnished with teeth, digestive organs, and limbs in accordance with the habits involved.

To begin with the teeth. We may observe that there are no incisors in the upper jaw, the hardened gum sustaining the pressure of the lower incisors, which are eight in number, with thin, broad edges; their position is not vertical, but oblique, so that their edges do not press directly against the gum, but rather their posterior surface. The two central are in general the largest, and the outermost on each side the smallest and most oblique. In the giraffe, however, the outermost is the largest, and it appears as if divided by a furrow. The molars are six on each side in both jaws: of these the first three are preceded by milk or deciduous teeth: the three posterior are originally permanent. Their surface is marked by two pairs of crescentic ridges. In the lower jaw these crescents have the convexity outwards; in the upper, the reverse. These crescents as they wear down by use show a centre of bone surrounded by a ridge of enamel. Between the molars and incisors of the lower jaw intervenes a vacant space.

With respect to the camels, though the number of molars on each side above is really six, five only are in a continuous series, and resemble molars in their shape: anterior to these continuous teeth, and separated by a considerable space, we find a tooth resembling in shape a stout short canine, being of a simple conical figure; this is the first molar: it has been called a second canine, but erroneously, the true canine, which is large, strong, and pointed, being placed before it, a small interval separating them. In the lower jaw the continuous molars are four, with a similar pointed and detached molar and canine; there being true canines, as well as canine-like molars, in both jaws. Incisors also are found in both jaws: four in the upper, but the two central are small and fall out early; the two lateral are permanent, and resemble canines in figure. In the lower jaw there are only six incisors, compressed, oblique, and pointed. Fig. 517 shows the dentition of the upper jaw, in two views; Fig. 518, that of the lower, also in two views.

The dentition of the Llamas closely approaches that of the camel; there are, however, in these animals only four molars on each side below, and five above, there being no detached canine-like molars. The Chevrotains (Moschidæ) are remarkable for the developement of the canines of the upper jaw in the male; they are pointed, recurved, compressed, with a posterior sharp edge, and project downwards out of the mouth. In the musk-deer they measure two inches and a half in length. There are no canines in the lower jaw. Incisors eight, as usual; none above. The existence of canine teeth in the upper jaw of the males, though not a universal feature among the Ruminants, is by no means uncommon. They occur in the males of many of the deer tribe, and we have seen them in a rudimentary state and buried in the gum in the female of the South American species; and they have been found in one species of antelope (Ant. montana, Rüpp.)—in this animal, however, they are only half-developed germs, becoming lost before the animal attains to maturity. (See 'Proceeds. Zoological Society,' 1836, p. 3.)

As the dentition of the Ruminants is so constant and unvarying in its general characters, so is the structure of the organs of progression; and where, as in the Camelidæ, we find a variation in the former, so do we also find a corresponding variation in the latter. On looking at the feet of a Ruminant, the first thing we observe is, that they are hoofed and cloven; an anatomy shows us that these hoof-cased toes, consisting of three phalangal bones, terminate a single long canon-bone. In the camels, however, the toes, instead of being short, abruptly truncated, and cased in pointed hoofs, so as to form a solid base on which to rest, are elongated and only tipped with small hoofs, the animal resting on a large pulpy sole or pad, placed like a cushion beneath the toes. (See Figs. 520 and 521.) Besides the two large or true toes, there are in some groups, as for instance the deer, two small short lateral toes consisting of three phalanges, and supported by stylets of bone. In the sheep these accessory toes are merely horny protuberances filled with condensed fatty cellular tissue.

The act of ruminating supposes a complicated structure of the stomach. This organ is divided into four compartments, viz.: 1, the first cavity or paunch, la panse (ventriculus); 2, the hood or honeycomb, le bonnet (reticulum); 3, the manyplies, le feuillet (omasus or psalterium); 4, the rud, la caillette (abomasus). These cavities are so arranged that the coarsely-ground herbage received into the first cavity is gradually propelled into the hood through a valvular aperture, where it is compacted into small balls, which, while the animal reposes at its ease, are returned seriatim to the mouth, to be remasticated by a voluntary effort. The aliment, when sufficiently remasticated, is again swallowed, and passes at once into the third, or plicated, compartment, by means of a peculiar mechanism, where it is compressed into flattened portions, which are gradually transmitted through a valvular orifice into the fourth compartment, or abomasus, the true digestive cavity.

The inner membrane of this portion secretes a fluid (the gastric juice) well known for its power of coagulating milk; taken from the calf, salted and dried, it is known under the name of rennet, and used in making cheese.

In young Ruminants, while their food is merely the mother's milk, the process of rumination is not carried on; and the proportion which the different compartments of the stomach bear to each other is very different from that presented afterwards, when their aliment is changed from milk to herbage. The huge paunch, for instance, is less than the abomasus, or fourth stomach, this being as yet the largest of the compartments, and the milk as it is swallowed passes at once into it, where it becomes curdled and then digested.

In the camel, besides the almost total absence of the third stomach, or omasus, there is another peculiarity to be noticed, viz. an arrangement of deep cells in the paunch for the reception and preservation of water, and the enlargement of the cells of the reticulum for the same purpose. The paunch is divided into two portions, a right and a left, by a longitudinal ridge of muscular fibres: in the left is a series of deep cells capable altogether of containing from four to five quarts of water; in the right is a smaller series capable of containing about a quart. When these cells are filled, the fluid is kept free from mixture with the food by the contraction of the orifice of each cell, and it can be forced out at pleasure by the action of a muscular expansion covering the bottom of this cellular apparatus. The deep cells of the reticulum are arranged in twelve rows, and are formed by muscular bands, intersecting each other transversely. This compartment in the camel appears to be destined exclusively as a reservoir for water, never receiving solid food, as in the ox or sheep; and it would seem that the remasticated food passes into the third small cavity, being conducted along the upper margin of the second, through a canal formed by a muscular ridge, which contracts with so much force as not only to open the orifice of the second cavity but so as to bring forward the mouth of the third into the second, by which action the muscular ridges that separate the rows of cells are brought close together, so as to exclude these cavities from the canal through which the water passes. Sir E. Home observes, that "while the camel is drinking, the action of the muscular band opens the orifice of the second cavity; at the same time it directs the water into it: and when the cells of that cavity are full, the rest runs off into the cellular structure of the first cavity. It would appear that camels, when accustomed to journeys in which they are kept for an unusual number of days without water, acquire the power of dilating the cells, so as to make them contain a more than ordinary supply for their journey; at least such is the account given by those who have been in Egypt." The llama resembles the camel in the arrangement of a cellular apparatus in the stomach. Fig. 511 represents a portion of the cellular apparatus of the camel's stomach, one-ninth of the natural size.

The Ruminantia are dispersed throughout the globe from the equator to regions within the arctic circle; but are most numerous in the warmer latitudes. The universality of the distribution of these animals is essentially connected with the welfare of our race, for not only is the flesh of most species acceptable as food, but that of some is in the highest estimation: nor is this all—their hair or wool, their skin, their hoofs, their horns, their antlers, nay, their bones, and even their intestines, are converted to our benefit. It is from this order that man has derived the most valuable of his domestic animals, which have spread with him as he has spread, becoming, like himself, denizens of the globe. Such is the case with the ox, the sheep, and the goat. Domesticated from the earliest period, they have ever formed a main part of the national wealth of civilised kingdoms, in all ages, and are intimately connected with the prosperity of our race. All the Ruminants, however, which man has domesticated are not universally spread; some few are adapted by their constitution to certain localities, beyond the bounds of which their value becomes diminished. They are formed for the places they tenant, and there are of the highest importance. Of these, one is the reindeer, an animal essential to the comforts if not the existence of the simple inhabitants of Lapland's ice-bound realm, where the ox and the sheep cannot exist. There "the reindeer form their riches." And again, who has not heard of the ship of the desert, the camel, which now, as in ancient days, freighted with merchandise, traverses the burning desert patient of thirst and hunger? To this animal let us first direct our attention.

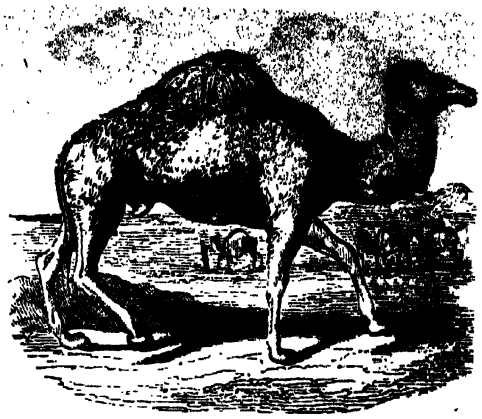
513 to 540.—The Camel

(*Camelus Dromedarius;* Gamal of the Hebrews, Djemel of the Arabs). Our pictorial museum is rich in specimens of the camel, with accompanying details so pertinent as to set forth the animal's history, and declare its use in graphic language speaking to the eye. There is something strange and imposing in the aspect of the gaunt and angular camel, destitute, as it confessedly is, of grace and animation. We are amazed at its height, its uncouth proportions, its long thin neck, its meagre limbs, and the huge hump on its back, which conveys the idea of distortion. Quietly it stands in one fixed attitude, its long-lashed eyelids drooping over the large dark eyes: it moves—and onwards stalks with slow and measured steps, as if exercise were painful. To complete the picture, it is covered with shaggy hair, irregularly disposed, here forming tangled masses, there almost wanting. Its thick mobile upper lip is deeply divided; its feet are large and spreading, the toes being merely tipped with little hoofs. There are two species of this animal, the Bactrian and the Arabian. It is to the latter that we shall first direct our observation.

The Arabian camel is distinguished from the Bactrian by having only one large fatty hump upon the back, and in being of a somewhat slighter make. It is not known in a wild condition, but most probably was indigenous in Arabia and the adjacent regions, the whole of its structure proclaiming the desert as its destined abode. Reclaimed from the earliest state, its history is interwoven with that of the patriarchs of old: time immemorial it has been the bondslave of man; and under his mastership is spread over the whole of northern Africa as far as Nubia, and from Syria, throughout Arabia, Persia and India, being valued in all these regions as a beast of burden. In central Asia the Bactrian camel takes its place, but it is inferior in those qualities which render the Arabian species so eminently adapted to the arid burning desert over which it moves silently along, heavily loaded, patient of thirst and hunger, thus maintaining an intercourse between districts separated by vast plains of sand, a barrier more effectual than that of the rolling ocean. It is the unwearied patience, the strength, the docility, the power of maintaining long journeys on scanty fare, that render the camel in its own country of intrinsic importance. By its means the merchant transports his merchandise from Aleppo or Baghdad to Mekkah or El-Basrah. Long strings of camels, or caravans, as they are called, venture across the desert, each animal bearing a load of 500 or even 600 pounds weight, and the procession moves at the rate of nearly three miles an hour, regular as clock-work, day after day for eight hours daily. A caravan of camels thus wending their way over the plain, their footsteps falling noiselessly, so that the ear cannot catch the sound of their approach, whether on hard ground or sand, strongly impresses those who for the first time witness this truly eastern spectacle, which indeed calls to mind the days when "a company of Ishmaelites came from Gilead with their camels, bearing spicery, and balm, and myrrh, going to carry it down to Egypt."

The more prominent of the structural peculiarities of the camel may here be briefly noticed. The camel treads flat on his toes, and not, as the ox, on a thick hoofed termination: we have already stated that they are cushioned beneath with large spreading callous elastic pads, connecting them together, and extending laterally beyond them, the horn-covered tips being alone free and separate (see Fig. 520—the Camel's Foot with the skin removed). This cushion expands by pressure at each step, a provision of evident advantage to the animal

512.—Camels watering.



513.—Swift Camel.

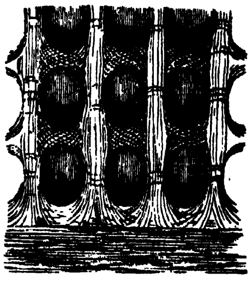
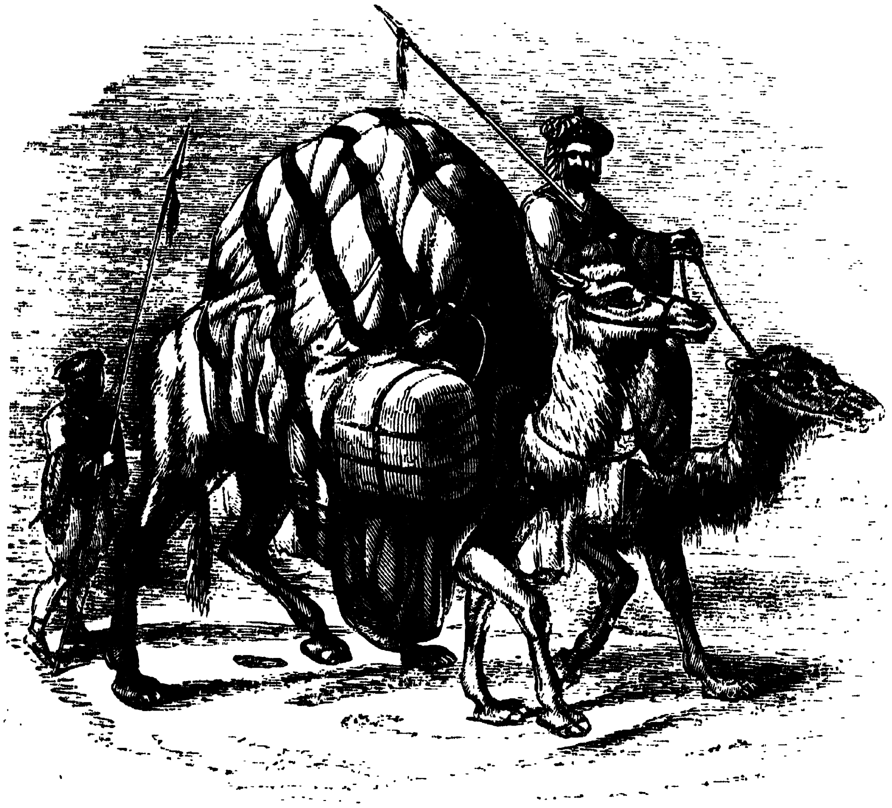
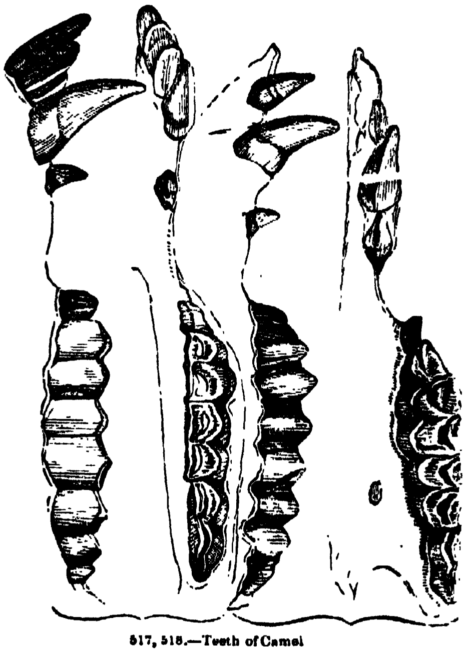


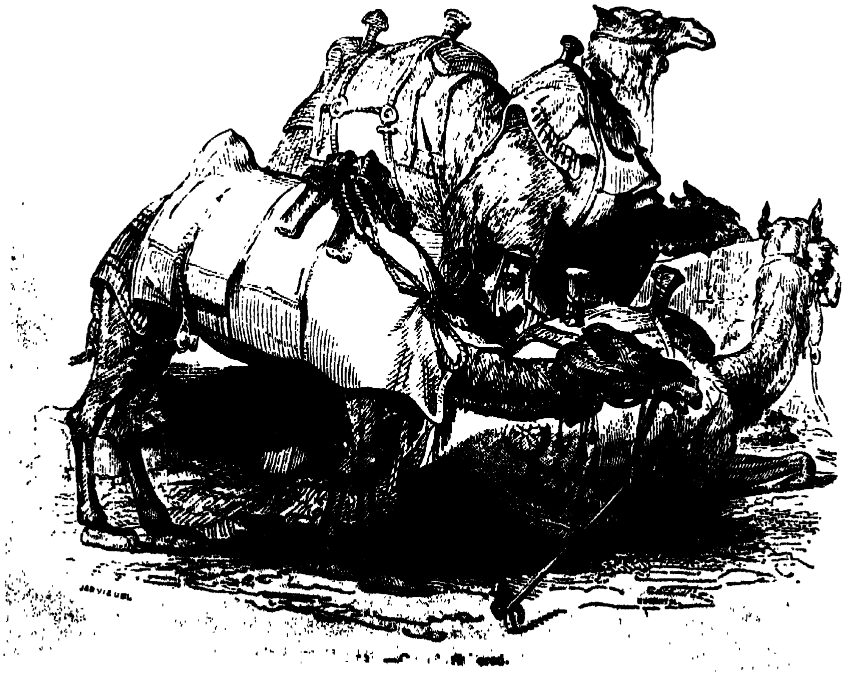
Fig. 511.



516.—Loaded Camels.

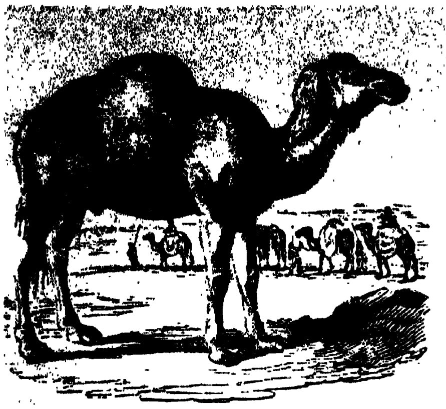


517, 518.—Teeth of Camel



[illegible]

[illegible].—Swift Camel.



527.—Camel.

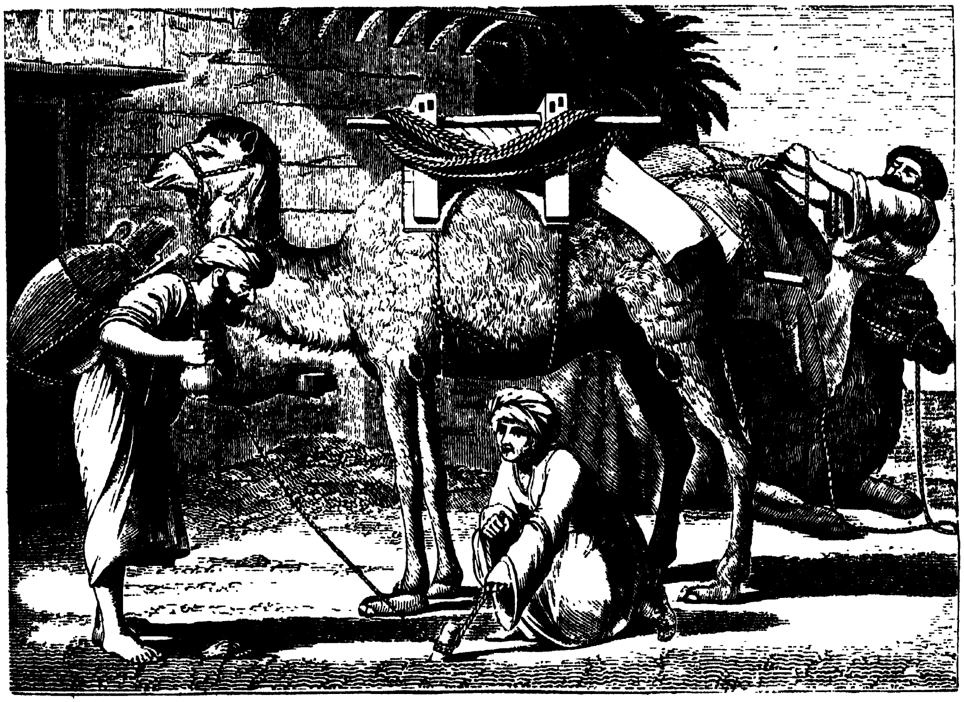
530.—Halt of Camels.

523.—Loading the Camel.

519.—Caravan in the Desert.

522.—Camel and Horse

524.—Head of Camel



525.—Loading the Camel

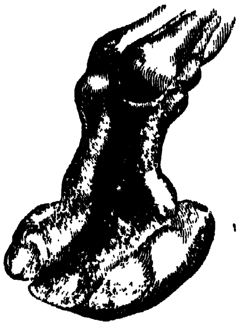


Fig 520

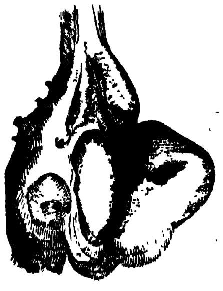
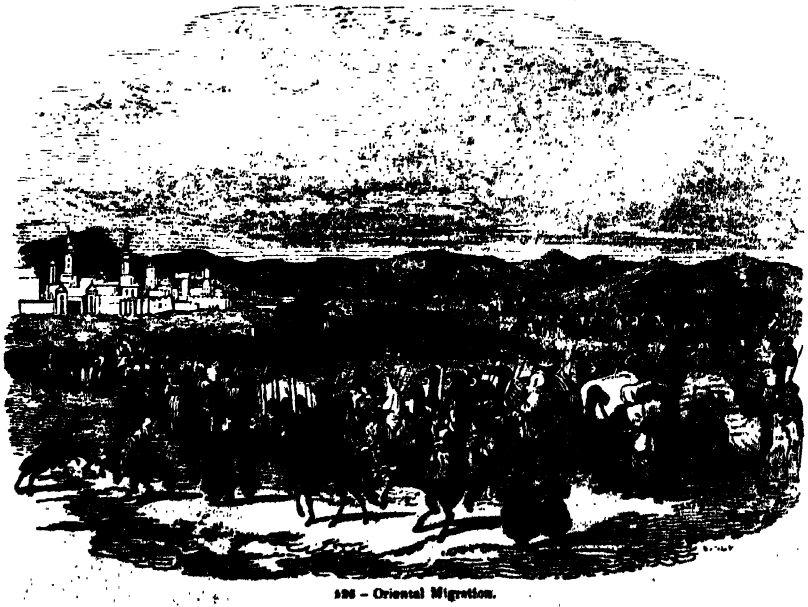


Fig 521

[illegible] of [illegible]



526 – Oriental Migration.

in passing over a sandy, yielding surface, while on hard or stony ground the elasticity of the pad gives ease to its movements. The camel kneels down to be loaded, and kneeling is its natural state of repose, and hence it is provided with certain callosities upon which to throw the weight of the body, both in kneeling down and rising up. The largest of these callosities occupies the chest, which is always brought to the ground; one is placed on each elbow and knee of the fore-limbs, one on the front of each knee of the hind-limbs, and a very small one on the outer side of each hock. These natural cushions are not produced by the habit of kneeling, as some have been ready to suspect, for the young camel is born with them already formed, and it may be observed that a similar callous pad is spread on the breast of the ostrich, which dwells in the desert, and reclines upon its chest. The camel is essentially the inhabitant of a flat expanse of country, beneath a burning sky. Elevated as it carries its head, it can discern the green oasis in the sea of sand, at a vast distance, and so acute is its sense of smell, that it can scent the far-distant water. To shield the large eyeball from the glare of light, a beetling brow overarches it, and long lashes fringe the upper lid. Incessantly exposed to clouds of suffocating dust, the camel has its nostrils so constructed as to exclude, as much as possible, the particles of sand driven by the wind; they are in the form of slits, converging towards each other, with elevated margins, the upper of which is capable of being shut down like the lid of a box, so as to close the aperture, or keep it open to any degree, at pleasure.

Hard and scanty is the desert fare upon which this animal subsists; but the fertile meads and flowery vales of our climate would afford it no temptation. Thorny shrubs, date-leaves, and the leaves and branches of the tamarisk, are its staple diet; and dates, beans, the hard kernels of which it crushes to powder, with cakes of barley, provided by its master, suffice to refresh it on its wearisome pilgrimage. Hence we see the necessity of its strong incisors, canine teeth, and canine-like molars, which enable it to browze on the coarsest shrubs with ease, and sever branches of considerable thickness. With its powerful, cleft, prehensile lip it draws the twigs or leaves to its mouth, or even nips off the tender shoots, or holds the tuft of herbage as it is gradually undergoing mastication. Hard and scanty, we have said, is the desert fare of the camel, but oftentimes the supply fails for days, or is to be obtained only in small quantities, and the travel-worn beast is put upon short allowance, then it is that we recognise the utility of that hump, which seemed at first a deformity. The fatty mass is gradually absorbed into the system, which thus receives nutriment, for the hump is a magazine against a time of want, to which the system has recourse when other supplies are inadequate.

It is a saying of the Arabs that the camel feeds on its own hump, and in a certain sense they are correct. After the wasting of this fatty mass, as described, three or four months of repose and copious nourishment are required to restore it to its usual condition, and this does not take place till the other parts are well replenished. When an Arab is about to commence a journey, the first thing about which he is solicitous is the state of his camel's hump.

We have already alluded to the cellular apparatus in the camel's stomach. At all times patient of thirst, with this provision the camel can endure for several days, beyond what is reserved in the cells; and sometimes, it is said, driven by necessity, the driver sacrifices his camel in order to obtain the water, and prolong, perhaps preserve, his existence. This may have happened, but the statement rests on insufficient authority.

From the data collected by Burckhardt there is great difference among different breeds of camels as respects the power of enduring thirst, according to the mode of life to which they have been inured. Thus the camels of Anatolia require water every second day during a summer's journey, but the camels of Arabia can dispense with it until the fourth, or even the fifth. In spring, when the young herbage is succulent, the camel scarcely requires to drink, and the journey across the great Syrian desert, from Damascus to Baghdad, twenty-five days, may be then performed without any water being needed by or given to the camels.

The senses of sight, hearing, and smell are exquisitely acute in the camel: it is said to delight in the jingle of the bells hung about its neck, for it is often thus ornamented, as in ancient days, and as pack-horses formerly were in England, perhaps in order that stragglers may be enabled to rejoin the caravan. (See Fig. 524.) Shells called cowries, and even ornaments of silver, are also added: the shells are strung in a semicircular form; hence the phrase, "ornaments like the moon."

During a journey it is customary to halt about four o'clock, to remove the loads and permit the camels to feed. If the Arabs are desirous of preventing them from straying too far, they tie their fore-legs together, or bind the fetlock to the upper joint by a cord. Towards evening they are called in for their evening meal, and placed in a kneeling posture round the baggage. They do not browze after dark, and seldom attempt to rise, but continue the process of rumination for the greater portion of the night. Amongst themselves they are sometimes very quarrelsome, and after the hardest day's journey, no sooner is the baggage removed than they begin to fight, and are prone to give each other the most savage bites, and are not to be separated without danger. (Fig. 532.) One of the favourite amusements of the Turks of Asia Minor is camel-fighting: each being previously muzzled, they strike each other's heads, twist their neck, wrestle with their fore-legs, each endeavouring to throw the other to the ground. Crowds attend to witness the spectacle, and, as at the disgraceful dog-fights of our country, the Turks will clap their hands, encourage their respective favourites, and bet upon their success. The Pasha of Smyrna used frequently to regale the people with these games in an enclosed square before his palace. It is, however, only at particular seasons that the temper of the animal is thus excited, and that these combats take place.

The camel is often excessively loaded, and sometimes, inhumanly, the load is laid on sores or wounds, yet even then the animal neither refuses to rise nor attempts to cast it off when suffering and irritated, however, he cries out, but his complaint is only of injustice, and then it must be extreme for him to complain at all. Fig. 532* is a delineation of the head of an ill used camel uttering its cry of distress. When a camel, loaded or unloaded, fails, from hunger and excessive fatigue, and sinks down, it seldom gets on its legs again, and is left to perish. Wellsted tells us that he often passed them when thus abandoned, and remarked the mournful looks with which they gazed on the receding caravan. When the Arab is upbraided with inhumanity, because he does not at once put a period to the animal's sufferings, he answers, that the law forbids the taking away of life save for food, and even then pardon is to be asked for the necessity which compels the act. When death approaches the poor solitary beast, vultures collect around and, eager for food, commence their repast even before life is extinct. The traveller continually sees remains of this faithful servant of man, exhibiting sometimes the perfect skeleton covered with a shrunk, shrivelled hide, sometimes the bones only, deprived of flesh, and bleached to dazzling whiteness by the scorching rays of a desert sun.

The Arabian or one humped camel is usually called, by way of distinction, the Dromedary, but erroneously. The Dromedary is a light variety of this species, and is termed Maherry or el Herrie in the Arabian desert, and Sabayee in the North of Africa. It is used principally for journeys of dispatch, carrying a single rider, or but a very light burden, and it will perform very long journeys in an almost incredible space of time. "When thou shalt meet a herrie, and say to the rider, 'Peace be between us,' ere he shall have answered, 'There is peace between us,' he will be far off, for his swiftness is like the wind," is an Arabian figure to illustrate the fleetness of this saddle-dromedary. This fleetness is however much overrated, and it is less by positive speed than by extraordinary powers of sustained exertion, day after day, through a time and space which would ruin any other quadruped, that it accomplishes such surprising journeys. Urged to a gallop, it cannot maintain its pace for half an hour, and is easily distanced by the horse; but it can sustain a forced trot for several hours together; Wellsted says for 24 consecutive hours, at the rate of from six to eight miles an hour. A gentle and easy amble of five or five miles and a half an hour is however the favourite quick pace of the dromedary, and if allowed to persevere in it, the animal will carry its rider an uninterrupted journey of several days and nights. A common caravan journey of 25 days is sometimes performed in five days at this rate. This swift breed is of great antiquity, and is referred to in several places in the Scriptures. The camels of Oman are the fleetest, the most beautiful, and the most high prized. It would appear that there is also a swift breed of the Bactrian or two-humped camel, which is in request in China.

The rate of travelling long journeys performed by the heavy caravan, each camel carrying from 500 to 800 pounds weight, does not exceed two miles and a half or two miles and three quarters an hour. This, however, can be maintained for 50 days in succession, and for eight hours each day; but a more lightly loaded caravan will not only travel quicker, but continue the march for nine or ten hours daily. In 1751 Mr. Carmichael traversed the great desert from Aleppo to Bussorah, his course being 797 miles with a caravan of heavily-loaded camels, and was 322 hours on the road. In 1781 Mr. Irwin travelled over the little desert from Aleppo to Baghdad, his route being 480 miles, in 193½ hours.

The soil best adapted to the camel's foot is a dry and hard, but fine and gravelly plain; where the sand is deep and soft, the loaded animal sinks at every step, and becomes rapidly exhausted. It can also ascend steep and rugged mountain-paths with considerable ease, but, as Belzoni once experienced to his cost, sometimes slips and rolls down.

Besides the commercial caravans which traverse the desert, there are also caravans of pilgrims to Mecca, enjoined by the Mohammedan religion. At Mecca meet the Mohammedans from Abyssinia to India. It appears, according to Burckhardt, that the pilgrimage from Damascus to Mecca with the Syrian caravan cannot now be performed in the most humble way under a cost of 125*l.* sterling; and yet there are from five to seven great caravans which regularly arrive at Mecca after the feast of Bairam, which follows the Ramadhan. To have visited the tomb of Mohammed, which entitles the pilgrim to the proud distinction of being a hadji, is an honour to which the meanest devotee aspires; and thus it is that within the walls of Mecca are annually assembled vast bodies of Asiatics and Africans, who have toiled thither, sustaining every privation and misery, and of whom many, worn out with fatigue, never return to claim the rewards of their enthusiasm. In these extraordinary journeys the camel sustains an important part, and, indeed, without the services of these animals—some bearing water in skins, some the merchandise of distant lands, some the food and necessaries of the pilgrims, and their own provender, and others the devotees—the pilgrimage could not be accomplished.

Mr. Parsons, who saw the pilgrim caravan set out from Cairo about 40 years ago, has given a programme of the procession, drawn up with all the precision of a herald, and which occupies ten pages of his quarto work. The cavalcade was six hours in passing him. The most striking appearance to a European must have been the camels, in every variety of splendid trappings, laden with provisions, clothes, and cooking apparatus, and water-skins, and tents, and artillery, and holy sheiks, and Mamelukes. There were camels "with two brass field-pieces each"—others "with bells and streamers"—others "with men beating kettle-drums"—others "covered with purple velvet"—others "with men walking by their sides, playing on flutes and flageolets"—others "handsomely ornamented about their necks, their bridles being studded with silver, intermixed with glass beads of all colours, and ostrich feathers on their foreheads"—and, last of all, "the sacred camel, an extraordinary large camel, with a fine bridle studded with jewels and gold, and led by two holy sheiks, in green, a square house or chapel on his back." In addition to these camel splendours there were horses with every variety of caparison, Mamelukes, and pikemen, and janissaries, and agas, and the emir Hadji (commander of the pilgrimage) in robes of satin—to say nothing of numberless "buffoons playing many pranks." Mr. Parsons sums up the splendour of this pilgrim caravan by declaring that "it is by much the grander exhibition than the spectacle of the Lord Mayor and Aldermen going in procession through the City of London,"—but this may be doubted by some as the exaggeration of a traveller, while others may deem it impossible.

Differing from the usual practice of commercial caravans, the pilgrimage is performed chiefly by night. The caravan generally moves about four o'clock in the afternoon, and travels without stopping till an hour or two after sunrise. A large supply of torches is carried from Cairo, to be lighted during the hours of darkness. The Bedouins, who convey provisions for the troops, travel by day only, and in advance of the caravan. The watering-places on the route are regularly established. Each is supplied with a large tank, and protected by soldiers, who reside in a castle by the well throughout the year. On parts of the route the wells are frequent and the water good, but on others, three days of the journey frequently intervene between one watering-place and another—and the fountain is often brackish. When the Cairo caravan is completely assembled, and the formalities which we have just described are gone through, the great body of travellers begin to move, the stations of the different parties of hadjis, according to their provinces and towns, being appointed, and rigidly observed throughout the march. This order is determined by the geographical proximity of the place from which each party comes. At Adjeroud, where the Egyptian caravan halts on the second day's march, it is supplied with water from Suez; and here it reposes a day and a night, to prepare for a forced march of three days and two nights, through a region where there is no water, the desert of El Tyh, which nearly extends from the head of one gulf of the Red Sea to the other—that is, from Suez to Akaba. The Hadj route is circuitous. It is here that the privations both of men and quadrupeds commence. The splendid trappings of the camels, their velvets and their bells, have lost their attraction; but their power of endurance becomes the safety of the pilgrims—while the richly-caparisoned horse, impatient of thirst, and more easily subdued by fatigue, is more frequently a burthen to the caravan than an advantage. The route of the Egyptian caravan, after it passes the Akaba, lies by the shores of the Red Sea for nearly six hundred miles; and, therefore, it cannot properly be said at any time after the first ten days' march to be upon the desert, as the Syrian caravan is for thirty days. But its difficulties are more numerous; and it has to pass regions quite as arid and inhospitable. Every part of Arabia is covered with sandy plains, and when the mountain steeps are crossed, the long extended valleys rarely offer water. The Arabic language is rich in words expressing every variety of desert, differing from each other by very slight shades of meaning: thus, they have terms descriptive of a plain—a plain in the mountain—a plain covered with herbs—a naked sandy desert—a stony desert—a desert with little spots of pasturage—a desert without water.* Although the caravan route from Cairo to Mecca presents, with the exception of the desert El Tyh, none of those enormous wastes, like the great Southern Desert of Arabia, "where the Arabs have only the sun and the stars to direct their way," nor is, like the Libyan desert, "a sea without waters, an earth without solidity, disdaining to hold a foot-print as a testimony of subjection," † there are many tracts, as well as the desert from Suez to Akaba, in the forty days' journey, which offer to the pilgrim abundance of fatigue and suffering. If water fail, as it sometimes does, even at the wells at particularly dry seasons—if the water skins evaporate more quickly than they ordinarily do—the camel's power of endurance is severely tried—for his wants are the last attended to. Happy are the pilgrims if the rain of the mountains have filled the banks of some little river. Even the much-enduring camels, at the sight of water, after many days' abstinence, break the halters by which they are led, and in rushing or stumbling down the banks throw off their loads, and occasion infinite disorder.‡ Mr. Buckingham has however described a scene in which the patience of the camel is contrasted in a remarkable way with the eagerness of the horse:—"It was near midnight when we reached a marshy ground, in which a clear stream was flowing along, through beds of tall and thick rushes, but so hidden by these, that the noise of its flow was heard long before the stream itself could be seen. From the length of the march, and the exhausting heat of the atmosphere, even at night, the horses were exceedingly thirsty: their impatient restlessness, evinced by their tramping, neighing, and eager impatience to rush all to one particular point, gave us indeed, the first indications of our approach to water, which was perceptible to their stronger scent long before it was even heard by us. On reaching the brink of this stream, for which purpose we had been forcibly turned aside, by the ungovernable fury of the animals, to the southward of our route, the banks were found to be so high above the surface of the water, that the horses could not reach it to drink. Some, more impatient than the rest, plunged themselves and their riders at once into the current; and, after being led swimming to a less elevated part of the bank over which they could mount, were extricated with considerable difficulty; while two of the horses of the caravan, who were more heavily laden than the others, by carrying the baggage as well as the persons of their riders, were drowned. The stream was narrow, but deep, and had a soft muddy bottom, in which another of the horses became so fastly stuck, that he was suffocated in a few minutes. The camels marched patiently along the edge of the bank, as well as those persons of the caravan who were provided with skins and other vessels containing small supplies of water; but the horses could not, by all the power of their riders, be kept from the stream, any more than the crowd of thirsty pilgrims, who, many of them having no small vessels to dip up the water from the brook, followed the example of the impatient horses, and plunged at once into the current.... This scene—which, amidst the obscurity of the night, the cries of the animals, the shouting and quarrelling of the people, and the indistinct, and perhaps exaggerated, apprehensions of danger, from a totally unexpected cause, had assumed an almost awful character—lasted for upwards of an hour." §

Fig. 512 represents this scene with considerable spirit.

The camel is not only valuable as a beast of burden, its milk is in requisition: it is the milk used for ordinary purposes by the Arabs, that of goats and sheep being generally made into butter. The Arab feeds his colt with it, and even gives it to his mare. Flour made into a paste with sour camel's milk is a common dish among the Bedouins; it is called ayesh. Rice or flour boiled with sweet camel's milk is another: it is called behatta.

Though the flesh of the camel was among the meats prohibited to the Jews, it is not only eaten, but relished by the Arabs: it is not often, however, that the Arab kills a camel in order to enjoy this luxury. When this does happen, the flesh is cut into large pieces: some part is boiled, and its grease mixed with borgoul (wheat boiled with some leaven and then dried in the sun), part is roasted, and, like the boiled, put upon the dish of borgoul The whole tribe then partake of the delicious feast The grease of the camel is kept in goat-skins, and used like butter. The woolly hair of the camel, which towards the close of spring is loose and easily pulled away from the skin, is applied to various purposes and woven into coarse cloth used as tent-coverings. Even the dung of the camel is not neglected: it forms the chief material for fuel in Egypt, Arabia, and Persia, and from the smoke, or rather soot, of this fuel is obtained sal-ammoniac, which was formerly procured almost exclusively from this source, and for the manufacturing of which there were, in 1720, laboratories at Cairo and other towns in Egypt.

At San Rossora the Tuscan government established a stud of camels for the purpose of carrying faggots, hay, straw, &c. from the domain of San Rossora to Pisa and other towns. It would appear that this establishment was founded about the middle of the seventeenth century, in the reign of the Grand-Duke Ferdinand de' Medici II We have not been able to ascertain to what extent the stud is now kept up, but in 1789 it consisted of one hundred and ninety six camels, male and female, and in 1810 of about one hundred and seventy.

The Moors introduced the camel into Spain and after the conquest of Granada, and the expulsion of the Moorish inhabitants, many of these animals remained in the southern districts; but the race was not kept up, and therefore Spain, where in various localities the camel would be peculiarly serviceable, no longer possesses this useful animal We learn that camels have been lately imported into South America from the Canary Islands with a probability of success

The camel has bred in the gardens of the Zoological Society.

The colour of this animal, as of most domestic animals, is subject to variety. The brown colour appears not to be esteemed; reddish or light grey is preferred Occasionally black camels are seen. In Egypt the average price of one of these beasts of burden is from thirty to fifty dollars but the swift Oman camels, which are much valued, sell at a higher rate, and Burckhardt mentions an instance in which 300 dollars were given for one When travelling in Nubia Burckhardt saw the camel almost in a wild state, whole herds being left to pasture unattended by men: they were kept for the sake of their flesh and milk, few being employed as beasts of burden, they even appeared frightened at the approach of men and loaded camels a circumstance this traveller had never before witnessed. The Nubian camels are generally white.

Many of our pictorial specimens of the camel are illustrative of scenes in its domestic life, and consequently of the manners of the people whose servant it is, and with whose history its own is intimately connected. Fig. 514—camels tethered, and unloaded of their luggage. Fig. 516—Loaded camels on a Journey. Fig 513 the Swift Camel, or Dromedary, Fig. 515—the same. Fig 519—a Caravan traversing the Desert. Fig. 522 a Camel at the sight of which a horse is startled—the latter animal, unless used to the camel, evinces fear at its appearance. Figs. 523, 525—Loading the Camel Fig 526 an Oriental Migration Fig. 530—Halt of Camels. Figs. 529, 531 Mounted Camels. Fig. 535,—Camel carrying a Bride. "One of the greatest solemnities of these simple Arab tribes is that of conducting a bride to her husband. The lady is placed in a frame on the back of a camel, and is housed over with carpets, shawls, and ostrich feathers. The camel is led by a relation of the bride, preceded by dancing people, music, mounted and dismounted Arabs, who shout and fire their guns, running backward and forward in the procession. Captain Lyon made a drawing of the bridal camel and his trappings.' Fig. 536—the Swift Camel, mounted. "The wandering Arab and his Maherry have an extraordinary appearance, which Captain Lyon has described. The saddle is placed on the withers, and confined by a band under the belly. It is very small and difficult to set, which is done by balancing the feet against the neck of the animal and holding a tight rein to steady the hand." Fig. 537—a Malefactor after punishment, paraded on a camel; his crime and sentence being proclaimed as he is led along. Fig. 528—Camel of the swift breed. Fig. 539—Camels watering at a Reservoir, called birket, and supplied by an Aqueduct, where caravans are accustomed to halt. Fig. 538—an Attack, by Arab robbers, upon a Caravan in the Desert. Fig. 540 a Bedouin Encampment. "Those who are, from reading or travelled observation, conversant with the existing manners of the Asiatic pastoral tribes, as the Arabians and the Tartars, can easily form in their minds a picture of this great migrating party. Under the conduct of their venerable emir, and the active direction and control of his principal servants, we behold, from the distance, a lengthened dark line stretching across the plain, or winding among the valleys, or creeping down the narrow pathway on the mountain side. That in this line there are hosts of camels we know afar off, by the grotesque outline which the figures of these animals make, their tall shapes, and their length of neck, and that the less distinguishable mass which appears in motion on the surface of the ground is composed of flocks of sheep, and perhaps goats, we can only infer from circumstances. On approaching nearer we find that all this is true, and that, moreover, many of the camels are laden with the tents, and with a few utensils and needments which the dwellers in tents require, and if the natural condition of the traversed country be such as to render the precaution necessary, some of the animals may be seen bearing provisions and skins of water. The baggage camels follow each other with steady and heavy tread, in files, the halter of those that follow being tied to the harness of those that precede, so that the foremost only needs a rider to direct his course, but nevertheless women, children, and old men are seen mounted on the other burdens which some of them bear. These are slaves, retainers, and other persons not actively engaged in the conduct of the party, and not of sufficient consequence to ride on saddled dromedaries. Such are reserved for the chiefs of the party, their women, children, relatives, and friends, and are not, unless it happen for convenience, strung together like the drudging animals which bear the heavier burdens."

533, 534. The Bactrian Camel

(*Camelus Bactrianus*) This species is at once to be distinguished from the Arabian by the presence of two humps on the back, it is comparatively rare, and limited in the extent of geographic range: it is spread, however, through central Asia, Thibet, and China, and is reported to exist in a wild state in Turkestan, anciently Bactriana. Pallas states that very large camels with two bunches occur wild in the deserts of Shamo, towards the frontiers of China; but as the Calmucks liberate all animals upon a principle of religion, we may conclude that these camels are the descendants of the domestic stock. Occasionally the Bactrian camel is seen in Egypt and Arabia during his travels through the latter country Niebuhr saw three, and only three, specimens and Mr Macfarlane met with only one in Asia Minor, which came from some remote province

In 1829 a Bactrian camel was daily led about the streets of London, it was a very fine male, of a dark rusty-brown colour, and very picturesque and striking in appearance, walking with a stately pace, and apparently well able to bear our climate. His hair was full, long, and shaggy, and hung like a fringe along his throat The natural country of this species, viz. the great middle zone of Asia, to the north of the Taurus and the Himalayah mountains, is very different in temperature from the hot regions of Arabia, whence it is probable that it might with due precautions become naturalized in Europe.

The manners of the Bactrian camel are the same as those of the Arabian, and its utility is as great as that of the latter. It is the patient, laborious, and willing slave of man, travelling over sandy deserts, and administering to the wants of a wandering people.

The height of this species is about eight feet between the two humps.

Here, then, we conclude our sketch of the history of the camel an animal, in the countries for which it is specially organized, the most important and valuable to man, and one of the earliest which he reclaimed to his service It is true that it has not spread, like the horse and the ox, over the whole globe, but the reason is evident: out of its own regions its value and importance are diminished, within them no other beast of burden can compete with it, and for ever will it remain, as it is and has been, the ship of the desert.

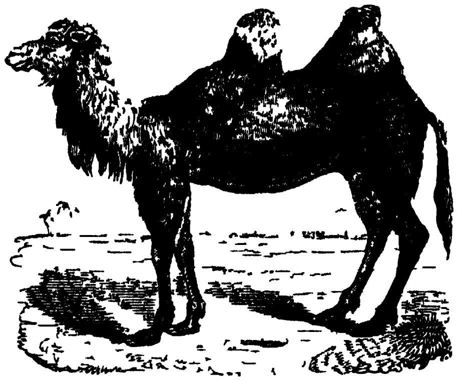
---

* See Humboldt's Voyage, tom vi. Note to p. 7.
† Purchas.
‡ Burckhardt's Nubia, p. 368
§ Buckingham's Mesopotamia.

529.—Mounted Camels.

538.—Attack by Arab Robbers.

Fig. 532*.



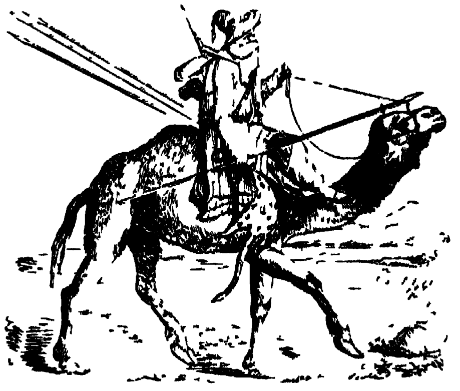
533.—Bactrian Camel.

531.—Mounted Camels.

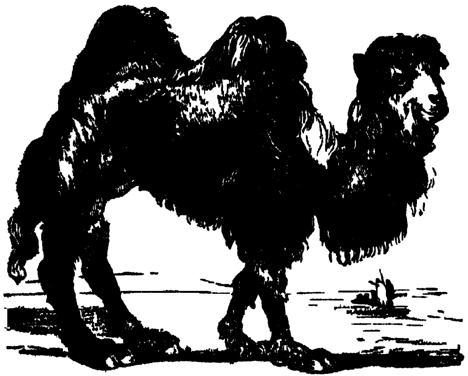
[illegible]

545.—Camel carrying a [illegible]

[illegible] Camels fighting.



[illegible]—Swift Camel [illegible]



534.—Bactrian Camel.

547.—Malefactor paraded on Camel.

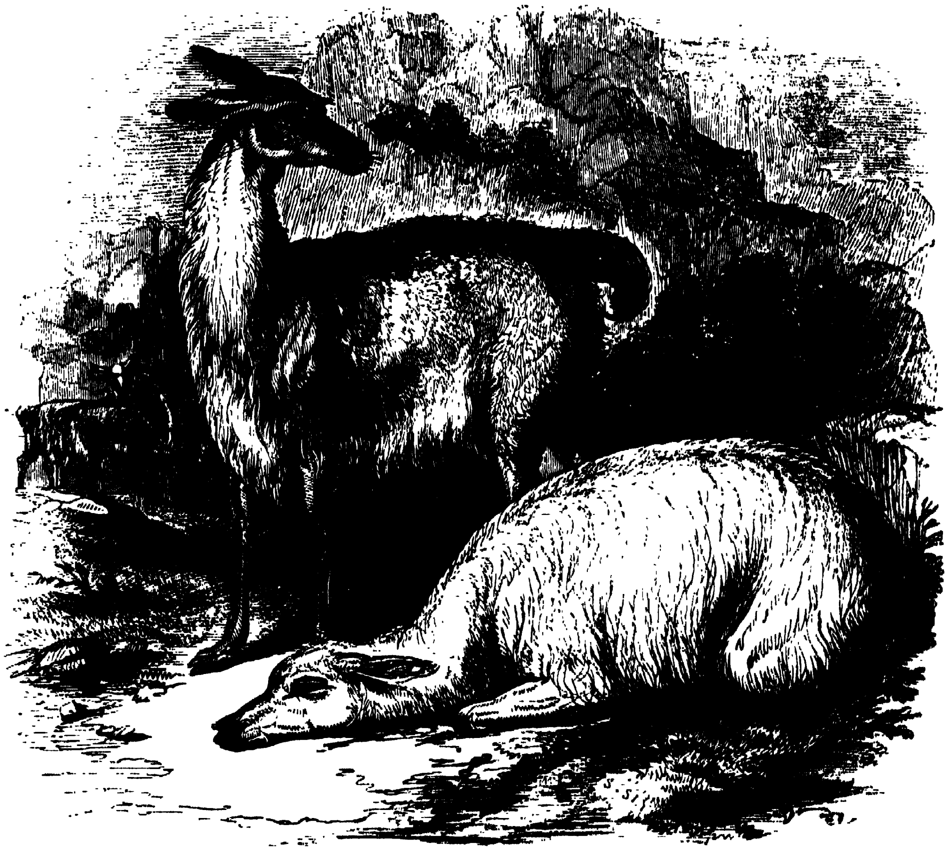
546.—Bedouin Encampment.

547.—Vicugna.

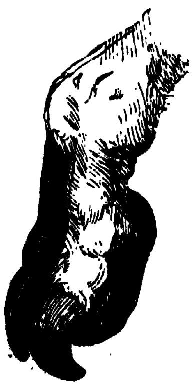
548.—Guanaco

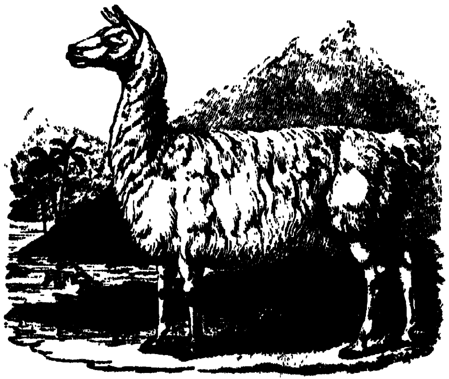
549 Male Brown Wild Llama or Guanaco.

550.—Paco.


ıanaco and Tame White Llama

[illegible]


551.—Foot of Llama.


554.—White Llama.

547 to 556.—THE LLAMA

Genus *Auchenia*). Under the general term Llama are comprehended three, if not more species, which belong to the same section of the Ruminants as the camel (*Camelidæ*). Indeed the llama was referred by Linnæus, and other naturalists of the last century, to the genus Camelus, from which Illiger separated it, and assigned it to a genus which he established under the title of Auchenia, in allusion to the length and slenderness of the neck, for which the llamas are remarkable.

The llamas may be regarded as the analogues of the camel; and, in the Cordilleras of Peru and Chili, are the mountain representatives of that desert-born servant of man.

In outward form, excepting that there is no hump on the back, in the general structure and cellular apparatus of the stomach, with the concomitant power of enduring thirst, or abstaining for a long season from water, in the expression of the large full overhung eye, in the mobility and division of the upper lip, the fissured nostrils, the slender neck, and meagre limbs, together with the long, woolly character of the clothing, the llama and the camel exhibit striking points of agreement. The foot of the camel, however, with its broad elastic pad, expressly adapted for traversing the sands of the desert, differs in its modification from that of the llama, destined to inhabit the rough and rocky Cordilleras, along the craggy sides of which the llama proceeds with a free and fearless step.

The foot of the llama (Fig. 551) consists of two springy toes, completely divided, each with a rough cushion beneath, and provided at the end with a strong short hoof, these hoofs are pointed at the tip, and hooked down somewhat like a claw, they are compressed laterally, and the upper surface represents an acute ridge, the under surface is linearly concave—a form well fitted for a mountain climber.

When the Spaniards first invaded Peru and Chili, they found the llama domesticated, and used as a beast of burden, its flesh and wool being also in great request. It was their only beast of burden: its flesh was eaten, its skin prepared into leather, and its wool spun and manufactured into cloth. One of the labours to which the llama was subjected was that of bringing down ore from the mines among the mountains: its ordinary load was 80 or 100 pounds, and its average rate of travelling with its burden 12 to 15 miles a day, over rugged mountain-passes, but, like the camel, if too heavily laden it would lie down, and obstinately refuse to proceed, nor would it bear to be urged beyond its accustomed pace. Gregory de Bolivar estimated that in his day 300,000 were employed in the transport of the produce of the mines of Potosi alone, and four millions annually killed for food.

Augustin de Zerate, treasurer general of Peru, in 1544, under the Spanish dominion, thus describes the llama, which he calls a sheep, though it is, he observes, camel-like in shape, but destitute of a hump:—"In places where there is no snow, the natives want water, and to supply this they fill the skins of sheep with water, and make other living sheep carry them, for it must be remarked, these sheep of Peru are large enough to serve as beasts of burden. They can carry about one hundred pounds or more, and the Spaniards used to ride them, and they would go four or five leagues a day. When they are weary they lie down upon the ground, and as there are no means of making them get up, either by beating or assisting them, the load must of necessity be taken off. When there is a man on one of them, if the beast is tired, and urged to go on, he turns his head round, and discharges his saliva, which has an unpleasant odour, into the rider's face. These animals are of great use and profit to their masters, for their wool is very good and fine, particularly that of the species called Pacas, which have very long fleeces, and the expense of their food is trifling, as a handful of maize suffices them, and they can go four or five days without water. Their flesh is as good as that of the fat sheep of Castile. There are now public shambles for the sale of their flesh in all parts of Peru, which was not the case when the Spaniards came first; for when one Indian had killed a sheep his neighbours came and took what they wanted, and then another Indian killed a sheep in his turn."

D'Acosta gives nearly a similar testimony, and notices two kinds (species)—one which is woolly and called Paco by the natives, the other covered with a slight fleece (villis levibus) only, and nearly naked, whence it is more fitted for carrying burthens, called Guanaco.

Captain G. Shelvocke, an Englishman who sailed round the world in 1719-22, gives a similar account, informing us that the Indians of Peru call these animals Llamas, the Chilese, Chilihueque; and the Spaniards, Carneros de la tierra.

With respect to the distinct species of llama, we learn from De Laet that, besides the domestic race, there are in Peru and Chili various wild animals, of which some are called Guanaco, or Huanacu, whence, from their resemblance to the tame breed, the latter have obtained the same appellation; their flesh is good, but, according to Garcilaso, inferior to that of the domestic or Huanacu llamas. These animals inhabit the mountain-ranges, where the males keep watch above whilst the females are feeding in the alpine valleys. When the males observe men approaching in the distance, they utter a sort of neigh, not unlike that of a horse, to warn the females, and if the men advance nearer, they flee, driving the females before them. The wool of these animals is short and rough, but is notwithstanding used by the natives for making cloth. These animals are taken in traps and snares. Another kind are termed Vicuñas, excepting that they have no horns, they are not much unlike goats, but are larger, and of a tawny or lion-like colour with a rufous tint: these live in the highest mountains, giving preference to the colder regions, and especially the bleak solitudes which the Peruvians designate by the common name of Punas. Frost and snow, so far from annoying, seem rather to invigorate them. They associate in flocks, and run with great swiftness. Such is their timidity that at the sight of men or wild beasts, they instantly betake themselves into hidden and inaccessible fortresses. Formerly these animals were very numerous, but they are now become much more rare in consequence of the promiscuous licence for hunting. Their wool is very fine, and resembles silk, or rather the fur of the beaver, and the natives deservedly estimate it highly: besides other properties, it is said to resist heat and impart coolness, and consequently is especially used in the manufacture of caps. Besides these are the Tarugas or Tarucas, which are larger and more swift than the Vicuñas, and of a more burnt colour, with pendulous and light ears, they rarely associate in flocks, but wander singly about the precipices: according to Garcilaso they are a species of deer, inferior in size to those of Europe. In the time of the Incas they were innumerable, and even entered the precincts of the towns, nor was there any deficiency of their fawns and does. All these animals, he adds, produce bezoar stones.

A question here arises, what is the Taruga described by De Laet? Is it identical with the Paco (otherwise called Paca or Alpaca) of D'Acosta, who, it may be observed, does not mention the Vicuna or Vicugna? This question is not easily answered. With respect to the Chilihueque of Shelvocke, the Hueque or Hueco of Molina, it is evidently identical with the Huanacu of De Laet, which is the Guanaco, and the words are the same, with trifling differences in orthography easily accounted for. We have then the domestic Llama, the Guanaco, the Paco or Alpaca, the Taruga, and the Vicugna.

Now it is generally believed by naturalists, and among them F. Cuvier, that there are really only three species, viz. the Llama, called, when wild, Guanaco, the Paco or Alpaca, and the Vicugna. Mr. Bennett, indeed, and Baron Cuvier, suspect there are but two species. The former expressly states that he should have little hesitation in proceeding still farther than F. Cuvier, being strongly inclined to agree with the Baron in regarding the Paco as a mere variety of the Llama with the wool more amply developed, and in considering the Vicugna as the only animal of that group that deserves to be specifically distinguished from that animal. From our own personal observations we are inclined to believe that there are three species as indicated by F. Cuvier, but we confess that we have our doubts as to whether De Laet's Taruga with pendulous ears may not prove to be a fourth species—a point, however, on which we would not insist. Our figures of these animals are as follows:—Fig. 553—the recumbent animal is the Domestic, the standing animal the Wild Llama, Figs. 554, 555, are the Domestic Llama, Figs. 548, 549, 552, the Wild Llama or Guanaco, Fig. 550—the Paco or Alpaca, Figs. 547, 556, the Vicugna.

The Guanaco (Auchenia Llama), in a domestic state, the Llama.—At what period the Guanaco became domesticated, whether before the foundation of the ancient Peruvian empire while the natives were in the rudest state of savage life, or after Manco Capac had established over the Peruvians the reigning line of Incas, it is useless to inquire. All we know is, that the Spaniards on their invasion found the llama trained as a beast of burden, and excepting as regards its milk, to them what the camel is to the native of the Arabian desert.

The Guanaco, or wild llama, is more slender and has an aspect more expressive of energy and spirit than its domesticated relative, but it soon becomes familiar in captivity. In its native regions, the highlands of Peru and Chili, it lives in herds, continuing among the mountains during the summer, but descending to the valleys on the approach of winter. At this latter season the Chilians hunt them with dogs, but it is only the young and the feeble that can be thus taken; the old ones are swift, active, and vigorous, and easily escape. During the chase they are said frequently to turn upon their pursuers, neigh loudly, and then take to their heels again. Indeed when alarmed they often stop in their flight to gaze at the object of their fear, and again gallop off.

The guanaco feeds upon mountain herbage, and especially a species of rushy grass called ycho; and when there is sufficient of this green fodder for them, they are never known to drink. The same observation applies to the domestic breed and the Paco and the Vicugna. Mr. Bennett suggests as a probability that they may have the power of extracting from their food sufficient liquid to satiate their thirst. It cannot have escaped notice that the secretion of saliva in these animals is remarkably abundant, even, as we have observed, in the hottest weather in England, and that upon the slightest offence, real or supposed, they discharge a copious shower of it over the person of the offender. May it not be that the naturally abundant flow of this saliva obviates the necessity of frequently drinking? This saliva was once supposed to possess acrid, irritating qualities, which certainly is not the case, though it must be confessed a sprinkling with rose-water would be more pleasant.

When assaulted and pushed to defend themselves, these animals strike with their fore-feet, and that with great energy, giving very severe blows: we have, indeed, seen them strike upon trifling provocation, though in general they are quiet and inoffensive.

The wool of the guanaco is in request, being of fine texture: the general colour is rich rufous brown, the head and ears being grey. The neck is peculiarly long, the tail a little raised and curved down. Height at the top of the shoulders about three feet and a half.

Mr. Darwin states, the guanaco "abounds over the whole of the temperate parts of South America from the wooded islands of Tierra del Fuego, through Patagonia, the hilly parts of La Plata, Chili, even to the Cordillera of Peru. Although preferring an elevated site, it yields in this respect to its near relative, the vicugna, on the plains of Southern Patagonia we saw them in greater numbers than in any other part. Generally they go in small herds from half-a dozen to thirty together, but on the banks of the St. Cruz we saw one herd which must have contained at least 500. On the northern shores of the Strait of Magellan they are also very numerous. Generally the guanacoes are wild and extremely wary. The sportsman frequently receives the first intimation of their presence by hearing from a distance the peculiar shrill neighing note of alarm. If he then looks attentively, he will perhaps see the herd standing in a line on some distant hill. On approaching them, a few more squeals are given, and then off they set at an apparently slow, but really quick, canter along some narrow beaten track to a neighbouring hill. If, however, by chance he should abruptly meet a single animal, or several together, they will generally stand motionless and intently gaze at him; then, perhaps, move on a few yards, turn round, and look again. What is the cause of this difference in their shyness? Do they mistake a man in the distance for their chief enemy, the puma, or does curiosity overcome their timidity? That they are curious is certain, for if a person lies on the ground and plays strange antics, such as throwing up his feet in the air, they will almost always approach by degrees to reconnoitre him. It was an artifice that was frequently practised by our sportsmen with success, and it had, moreover, the advantage of allowing several shots to be fired, which were all taken as parts of the performance. On the mountains of Tierra del Fuego, and in other places, I have more than once seen a guanaco, on being approached, not only neigh and squeal, but prance and leap about in the most ridiculous manner, apparently in defiance, as a challenge. These animals are very easily domesticated, and I have seen some thus kept near the houses, although at large on their native plains. They are in this state very bold, and readily attack a man by striking him from behind with both knees. The wild guanacoes, however, have no idea of defence: even a single dog will secure one of these large animals till the huntsman can come up. In many of their habits they are like sheep in a flock. Thus when they see men approaching in different directions on horseback, they soon become bewildered, and know not which way to run. This greatly facilitates the Indian method of hunting, for they are thus easily driven to a central point and encompassed. The guanacoes readily take to the water; several times at Port Valdes they were seen swimming from island to island. Byron, in his Voyage, says he saw them drinking salt water. Some of our officers,

likewise, saw a herd drinking the briny fluid from salina near Cape Blanca. I imagine, in several parts of the country, if they do not drink salt water, they drink none at all. In the middle of the day they frequently roll in the dust in saucer-shaped hollows. The males fight together; two one day passed quite close to me, squealing, and trying to bite each other; and several were shot with their hides deeply scored. Herds sometimes appear to set out on exploring parties. At Bahia Blanca, where, within 30 miles of the coast, these animals are extremely unfrequent, I saw one day the tracks of 30 or 40 which had come in a direct line to a muddy salt-water creek. They must then have perceived that they were approaching the sea, for they had wheeled with the regularity of cavalry, and had returned back in as straight a line as they had advanced. The guanacoes have one singular habit, which is to me inexplicable, namely, that on successive days they drop their dung in the same defined heap. I saw one of these heaps which was eight feet in diameter, and necessarily was composed of a large quantity. D'Aubigny says that all the species of this genus have this habit, and Frezier remarks that it is very useful to the Indians, who use the dung for fuel, and are thus saved the trouble of collecting it. The guanacoes appear to have favourite spots for dying in. On the banks of the St. Cruz the ground was actually white with bones in certain circumscribed places, which were generally bushy, and all near the river. On one such spot I counted between ten and twenty heads. I particularly examined the bones; they did not appear, as some scattered ones which I have seen, gnawed and broken, as if dragged together by some beasts of prey. The animals must have crawled, before dying, beneath and amongst the bushes. Mr. Bynoe informs me that during the voyage he observed the same circumstance on the banks of the Rio Gallegos. I do not understand the reason for this, but I may observe that all the wounded guanacoes at St. Cruz invariably walked towards the river. At St. Jago, in the Cape de Verd islands, I remember having seen in a retired ravine a corner under a cliff where numerous goats' bones were collected: we at the time exclaimed that it was the burial ground of all the goats in the island. I mention these circumstances, because in certain cases they might explain the occurrence of a number of uninjured bones in a cave, or buried under alluvial accumulations, and likewise the cause why certain mammalia are more commonly imbedded than others in sedimentary deposits. Any great flood of the St. Cruz would wash down many bones of the guanaco, but probably not a single one of the puma, rhea, or fox." ('Voyage of the Beagle.')

Like the elephant, the horse, the camel, and many others, the guanaco has its fossil prototypes. Mr. Darwin found at Port St. Julian (Patagonia) the fossil bones of a llama which must have fully equalled the camel in magnitude, and he observes that, "as the guanaco is the characteristic quadruped of Patagonia, and the vicugna of the snow-clad summits of the Cordilleras, so in bygone days this gigantic species of the same family must have been conspicuous on the southern plains."

The domestic llama is more stoutly built than the guanaco, its limbs are thicker, its neck shorter, and its aspect more subdued. The wool is longer and fuller, but of a coarser quality. We have seen brown and white individuals, but the white seem to be the most common.

When the Spaniards became acquainted with Peru and Chili, these animals were kept by the natives in vast numbers; but now the horse, the ass, and especially the mule, have superseded the llama as a beast of burthen; while the introduction of the sheep, the goat, and the ox has rendered it less necessary, either as contributing by its flesh or its fleece to the benefit of man. In some places, however, it still is, or was recently, employed as a beast of burthen.

The Paco (*Auchenia Alpaca*, Desm.; *Camelus Pacos*, Linn.), Figs. 548, 549, 552, is as large as the guanaco, but proportionately shorter in the limbs; its forehead, instead of being regularly arched to the nose, rises abruptly prominent above the eyes; the wool is long, delicately fine, and silky, excepting on the head and limbs, and of a deep fawn colour; it is moreover disposed in long flakes or tassels. Black varieties also occur, of which a most beautiful specimen some years ago existed in the Gardens of the Zool. Soc. Lond.

The paco dwells in herds among the mountains of Peru and Chili; it is less fleet than the light-limbed guanaco, but its general habits are the same; it would appear, however, to frequent a higher and colder range of elevation, as it is said to be frequently seen with herds of vicugnas.

The Vicugna, or Vicuña (*Auchenia Vicugna*), Figs. 547, 556, is a smaller animal than either the guanaco or the paco, and more slender in its proportions. Its limbs are thin, its neck swan-like, the forehead is broad and also prominent, but not abruptly so, as in the paco; the muzzle is very narrow, and the head short. The eyes are large, and the ears long. The height of the animal at the shoulder is about two and a half feet.

The wool of the body is extremely delicate and soft, varying from an inch to three inches in length: on the breast it is of the latter measurement; on the head and limbs it is close. The colour is pale yellowish brown, passing into white on the under parts.

The vicugna lives in herds on the bleak and elevated parts of the mountain-range bordering the region of perpetual snow, amidst rocks and precipices, where the chase is both toilsome and arduous. The Cordilleras of Copiapo, Coquimbo, and Peru are the principal seats of its abode, but it is also found in Chili. Its manners very much resemble those of the chamois of the European Alps, and it is as active, vigilant, wild, and timid. Its wool is highly valued, and for this alone thousands are annually killed, various means being employed in their wholesale destruction.

Holding, as the llamas do, especially the paco and vicugna, so conspicuous a place among wool-bearing animals, it is singular that after Europeans became acquainted with them, and with the beautiful fabrics manufactured by the native Peruvians, three centuries should have elapsed before any attention was paid in Europe to the importation of their produce as an article of commerce, or any attempts were instituted with regard to the naturalization of the animals in localities best fitted for their multiplication, and this more especially as the fineness of the wool had, from the first, attracted the notice both of the Spaniards and other Europeans. That no difficulty exists in the transportation of the llama to Europe, and that it bears our climate well, is abundantly proved by the numerous individuals which have lived both in the Gardens of the Zoological Society and in other places, and which, under the inevitable disadvantages of confinement, and perhaps too luxurious a diet, have continued long in health and vigour—as long, indeed, as animals indigenous to Europe under the same circumstances. There can be therefore no doubt but that if suffered to wander at large, in situations resembling as nearly as possible those of their native regions regions, be it remembered of cold, and snow, and storms—these animals would thrive and multiply.

The coarse herbage of the mountains, and the rushy grass called yeho, which covers the slopes of the hills, constitute the natural diet of the wild races and in the mountains of Scotland, Wales, and Ireland herbage of a corresponding nature would meet their appetite, while, as far as temperature is concerned there would be no impediment to their naturalization.

At the Ninth Meeting (held at Birmingham) for the Advancement of Science, the value of the silk wool of these animals, and the benefits which would result from their naturalization in our country, formed an interesting topic of discussion. The subject was introduced by Mr. W. Danson who, in illustration of his views, exhibited samples of Alpaca wools, and manufactured specimens in imitation of silk (and without dye) as black as jet. Mr. Danson urged that "the animals producing it ought to be propagated in England, Ireland, Scotland, and Wales and stated that to the two latter places the alpaca is well suited, being an inhabitant of the Cordilleras, or mountain district in Peru. Importations of the wool) have already taken place to the extent of one million of pounds, and are likely to increase. There are five species of llamas: of these the alpaca has fine wool, six to twelve inches long, as shown by the specimens exhibited: the llama, coarse long hair, and the vicugna, a very short fine wool, more of the beaver cast. The Earl of Derby has propagated the alpaca in his private menagerie at Knowsley, and Mr. Danson understood that Mr. Stephenson, at Oban in Scotland, has a few of these animals. The wool of these animals would not enter into competition with the wool of the sheep, but rather with silk. It is capable of the finest manufacture, and is especially suited to the fine shawl trade of Paisley and Glasgow, &c. The yarns spun from it are already sent to France in large quantities, at from 6s. to 12s. 6*d* per pound, the price of the raw Alpaca wool being now 2*s*. and 2*s*. 6*d*. per pound."

560, 564, 565, 566.—THE GIRAFFE

(*Camelopardalis Giraffa*; Zarapha, Zerafet, and Zürafel of the Arabs; Surnapa, Zurnapa and Zurnepa of the Turks). The genus Camelopardalis stands in a certain sense isolated among the Ruminants, and is the representative of a family group, intermediate, as Professor Owen's researches demonstrate, between the Deer and the Antelopes. Col. H. Smith, indeed, has observed that the characters of the giraffe offer a mixture of several genera, among which the followers of the quinary system may select whether to class it, with Illiger, among the Camels, or, with other naturalists, among the Cervine or Antelopine animals; and he points out its assimilation with the camels, in the length of its neck, the callosities on the sternum and knees, and the want of spurious hoofs, adding that this approximation did not escape the notice of the ancients.

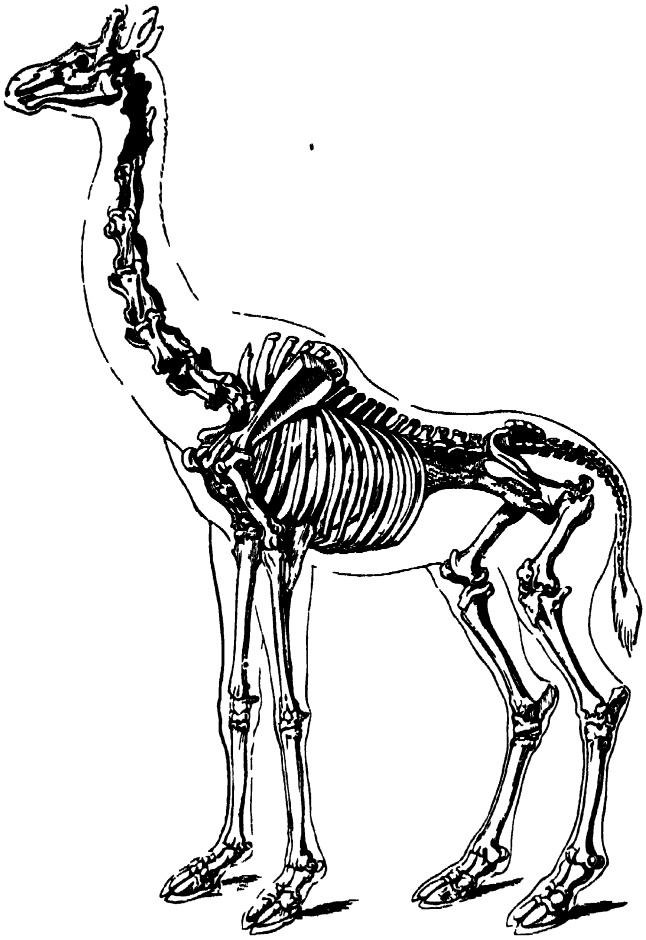
This extraordinary animal, of which at one period the very existence was almost doubted, has become now familiar to us; and though we gaze with wonder upon its strange proportions, we no longer regard it as one of the monsters of a land which credulity pictured as tenanted by creatures which exist only in imagination. On beholding the giraffe we are at once struck with the shortness of its body, the length of its limbs, the elevation of its withers, and the elongation and slenderness of its neck, supporting a small and delicately modelled head. Its movements are no less strange than its figure; for owing to the shortness of the body, and the length of the limbs, the hind hoofs are brought at each step as far forward as the spot the previous moment occupied by the fore hoofs, but somewhat to the outside of it, for the hind limbs diverge somewhat outward from the hock-joint. The legs of each side are in action nearly in unison together, those of the right side appearing to alternate with those of the left, and *vice versâ*.

The giraffe, however, is not really awkward, and is very far from being slow, indeed the swiftest coursers of the desert are scarcely equal to the chase, and among rugged and broken ground utterly unable to overtake it.

When walking along, the giraffe does not ordinarily carry its beautiful swan-like neck upright, but obliquely forwards in a line continued from the spine, over the withers, to the top of the head—an attitude scarcely consistent with grace; the animal, however, often wreaths it very gracefully, nor can anything produce a more imposing effect than the giraffe when its neck is stretched up to the full, while the animal gazes around with his large beaming eyes, or plucks the foliage from the branches of the trees browsing beneath their shade.

It is scarcely necessary to state that the giraffe is exclusively confined to the continent of Africa. Its characters may be detailed as follows:—The head (Fig. 562) is small, and narrows to a slender elongated muzzle entirely covered with hair. The nostrils are longitudinal slits capable of being closed or opened at pleasure, the upper lip is endowed with great flexibility and muscular power, and projects beyond the lower, it is used as an organ of prehension in the acquisition of food. The tongue is an extraordinary instrument, and requires special notice. It is long, slender, pointed, and endowed with a surprising share of mobility. Nor is this all; it is capable of being greatly elongated, and in this state of being coiled round twigs or branches, and of drawing them to the mouth (Figs. 559, 561). In this respect it is analogous to the proboscis of the elephant, and is at once a feeler, a grasper, and an organ of taste. It is interesting to see with what address the giraffe uses this instrument, and how dexterously he applies it as a hook or holder. It is smooth, except when the papillæ are raised—its surface then becomes rough; its colour is black. The eyes are full, dark, lustrous, and prominent, and the upper eyelid is furnished with a fringe of long lashes. So prominent indeed are the eyes, that they command, without the animal moving its head, a survey of the whole horizon, thus enabling it to see, without turning, what passes on each side and even behind it, and, from the elevation of the head, to discern its enemies at a great distance. Fig. 558 represents a back view of the giraffe's head, showing this advantageous position of the eyes. The ears are long, pointed, and moveable; and the sense of hearing is very acute. There are no suborbital sinuses. Both sexes have horns, if they can be so termed, for they are truly analogous to the peduncles of the horns in the Muntjak-deer, being in fact processes of bone covered with skin, having a tuft of black hairs at the top; but besides these substitutes for horns, a similar but shorter process projects from the forehead between the eyes, more developed in males than females, and in adults than in the young. According to Ruppell and Cuvier, this, like the other horns, is articulated by suture to the skull; but Professor Owen has demonstrated that this frontal protuberance is not a true horn articulated by a suture, but results from a singular thickening of the bone of the forehead (see Fig. 563). The osseous peduncles, or horns as they are commonly called, continue for a long time united to the frontal bone only by means of a suture, and are not fairly anchylosed till at an advanced period. This indeed is the case with all the bones of the skull of the giraffe: it would appear that the process of ossification is carried on but slowly in this part of the frame-work, and as it respects the horns, that nature having completed the first stage of her intentions,

555.—Tame Llama (white).



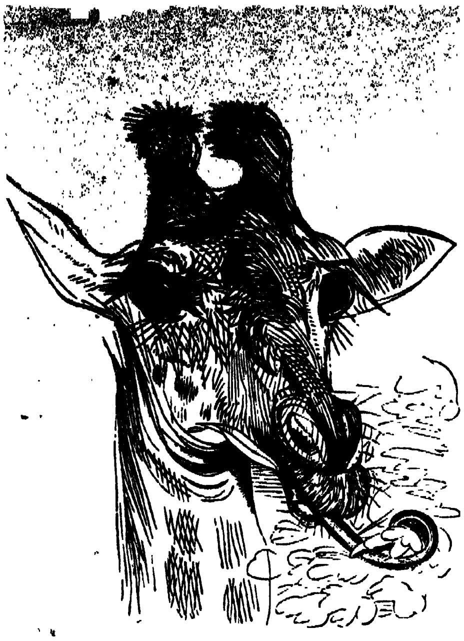
[illegible].—Skeleton of Giraffe

560.—Giraffe

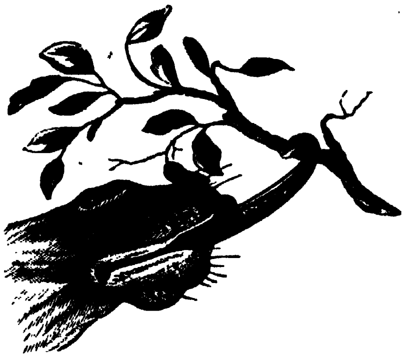
[illegible] Head.

[illegible].—Giraffe about to lie down.

[illegible].—Vicugna.

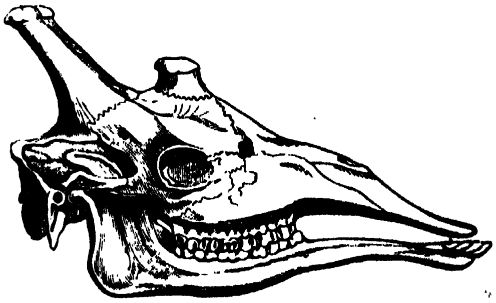


561.—Mode of procuring food.

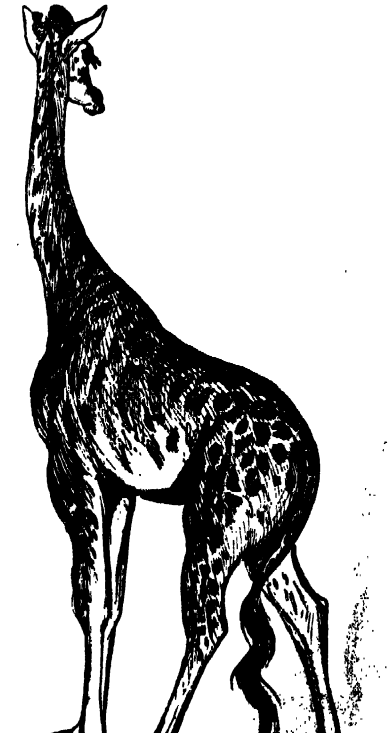


559.—Mode of procuring food.

562.—Head of Giraffe.



563.—Giraffe.



564.—Giraffe.

having in fact prepared the peduncles, was arrested in her operations and forbidden to add the antlers.

The long flexible neck of the giraffe is provided with a short mane extending from the withers to the top of the head: the elevation of the withers is remarkable, and from this part to the crupper there is a rapid descent, whence has arisen the idea that the fore-limbs are much longer than the hinder pair, which is not the case. The fore-knees are large, and when about to lie down the animal sinks upon them, and assumes an attitude by no means easy or graceful. (Fig. 566.)

The tail is rather long, slender, and tufted at the extremity with long coarse black hairs. The skeleton of the giraffe (Fig. 557) is well worthy the attention of an anatomist; we cannot here enter into osteological minutiæ, but recommend our readers to Professor Owen's papers in 'Proceeds. Zool. Soc.' 1838; and to Cuvier's 'Leçons d'Anatomie Comparée.'

In giving a sketch of the history of the giraffe, we may commence by observing that some naturalists of the present day consider that there are two distinct species, one peculiar to Nubia, Abyssinia, and the adjacent districts, the other a native of the regions of Southern Africa. We regard them as mere varieties.

It is with the North African variety that the ancients were acquainted, and of which there are several delineations preserved to the present day. Among the most remarkable is one on the Prænestine pavement, where two of these animals are pictured: one in a straddling attitude endeavouring to reach the ground with his mouth; the other in the act of browsing on the trees. It is supposed that this pavement, which was executed by the direction of Sulla, is the work of Egyptian Greeks. Belzoni notices the giraffe on the walls of the Sekos of the Memnonium and on the back of the temple of Erments. A giraffe led by Nubians is given in Rosellini's work on Egypt.

It is supposed by some that the word Zemer, translated Chamois in the book of Deuteronomy (ch. xiv., v. 5), of which animal the flesh was forbidden, really refers to the giraffe, and there is certainly some affinity between the Hebrew Zemer and the Arabic Zurafa or Zurafet. It is a point, however, not easily decided.

Though the Prænestine pavement was made by the orders of Sulla (born A.C. 138), the animal itself was not seen in Rome before the time of Julius Cæsar, who exhibited it at the Circensian games. It is described by Pliny (book viii.) from a specimen, as is conjectured, which Varro mentions as having been brought from Alexandria. Afterwards the giraffe became not unfrequent among the animals exhibited in the Roman games.* Oppian, who lived in the second century, notices this animal in the third book of his treatise on hunting. Gordian III., emperor of Rome from A.D. 239 to 244, is stated to have possessed ten of these animals. After the fall of the Roman empire we hear nothing of the giraffe for a considerable period. The first instance, after the darkness of the middle ages had passed, of a living giraffe in Europe, is that of one possessed by Frederick II., king of Germany (crowned 1215), which he received from the prince of Damas, now Damascus, and which was described by Albertus Magnus under the name of Anabula, with the synonyms Seraph, Oraflus, and Orasius.

Towards the end of the fifteenth century the Soldan of Egypt presented one of these animals to Lorenzo de' Medici, grand-duke of Tuscany: it was a great favourite with the inhabitants of Florence, and was accustomed to walk about the streets, stretching its neck to the balconies and windows for fruits and other articles of food. Its picture exists in the frescoes of the Poggio Acajano, one of the duke's villas near Florence.

From this time no living giraffe was seen in Europe for nearly three centuries and a half; though in that space various descriptions and figures were published by writers on natural history, mixed up with abundant errors. Gesner, however, gives a tolerable account and figure in his 'Natural History,' published in 1551. Thevet, in his 'Cosmographia' (1575), describes and figures the giraffe; Bellonius, in his 'Observations,' 1605, also figures it; Wolfgang, in his 'Historia Animalium Sacra,' mentions it. Topsell, in his 'History of Four-footed Beasts' (1607), describes it, and gives two figures. Leo Africanus and Ludolph both describe the giraffe, as does Johnston (cum figura) in his 'Quadrupeds.' We may also mention Alpinus ('Nat. Hist. Egypt'); and Carteret, whose paper read before the Royal Society is entitled 'Observations on a Camelopardalis found about the Cape of Good Hope.' (See 'Phil. Trans.' lx. p. 27.) Buffon describes and figures the giraffe, but in his drawings, as in those of all the preceding writers, the fore-legs are much too long. In the supplement (Supp. vol. vii.) the figure is improved, but still is not without faults. Vosmaer published in 1787, at Amsterdam, a quarto tract on this animal, with tolerable figures. It may here be noticed that when the supplement to Buffon's great work was published there was an adult female specimen in the museum of Paris, and M. Allemand of Amsterdam had also a young specimen.

Le Vaillant when in South Africa hunted the giraffe and procured some specimens; his description of the habits of the animal and his narrative of the incidents of the chase are interesting and graphic, but perhaps a little overcoloured. It is from this time that we may date our correct knowledge of this animal, of which several skins found their way from time to time into our island; that brought by Mr. Patterson, and ultimately deposited in the British Museum, being the first.* It was in the year 1827 that the first living giraffe visited our shores. The Pasha of Egypt destined four of these animals as presents to some of the European princes: of these, one died at Constantinople; one reached Venice, 1828; one was sent to Paris; and the fourth, which fell by lot to England, reached its destination safely in August, 1827, but died, worn out by illness, in 1829. Its preserved skin and skeleton were presented by H. M. George IV. to the Zoological Society, and now grace the museum of that Society.

In 1836 the arrival of four living giraffes at the gardens of the Zool. Soc., procured in Kordofan by M. Thibaut, created a lively sensation in the world of science. From a letter of M. Thibaut to the secretary of the Zool. Soc., in which he details his proceedings and manner of conducting the exhausting pursuit, we take the following extract:—"The first run of the giraffe is exceedingly rapid. The swiftest horse, if unaccustomed to the desert, could not come up with it unless with extreme difficulty. The Arabs accustomed their coursers to hunger and to fatigue; milk generally serves them for food, and gives them power to continue their exertions during a very long run. If the giraffe reaches a mountain, it passes the heights with rapidity: its feet, which are like those of a goat, endow it with the dexterity of that animal: it bounds over ravines with incredible power; horses cannot, in such situations, compete with it. The giraffe is fond of a wooded country. The leaves of trees are its principal food. Its conformation allows of its reaching their tops. The one of which I have previously spoken as having been killed by the Arabs measured twenty-one French feet in height from the ears to the hoofs. Green herbs are also very agreeable to this animal; but its structure does not admit of its feeding on them in the same manner as our domestic animals, such as the Ox and the Horse. It is obliged to straddle widely; its two fore-feet are gradually stretched widely apart from each other, and its neck being then bent into a semicircular form, the animal is thus enabled to collect the grass. But on the instant that any noise interrupts its repast, the animal raises itself with rapidity, and has recourse to immediate flight. The giraffe eats with great delicacy, and takes its food leaf by leaf, collecting them from the trees by means of its long tongue. It rejects the thorns, and in this respect differs from the camel. As the grass on which it is now fed is cut for it, it takes the upper part only, and chews it until it perceives that the stem is too coarse for it. Great care is required for its preservation, and especially great cleanliness. It is extremely fond of society, and is very sensible. I have observed one of them shed tears when it no longer saw its companions or the persons who were in the habit of attending to it." ('Proceeds. Zool. Soc.,' 1836.)

The efforts made by the spirited agent of the Zool. Soc. in Nubia, and the success of his arrangements for the transport of the animals from the interior to the coast, not only encouraged others to make a similar attempt, but opened the way for them in which to proceed; and subsequently other living specimens were sent to Malta, and thence to England, so that at one time there were seven giraffes in London.

The giraffe with due care endures our climate well; the female in the gardens of the Zool. Soc. has bred twice; the first fawn died, but the second, which grew rapidly, is in excellent health and condition.

The giraffe, as its figure, the mobility of the lips, and the prehensile power of the tongue declare, is formed for browsing on the leaves of trees, those of the mimosa being especially relished. The first giraffe which Le Vaillant saw was under one of these trees, on the leaves of which it was making a repast: with his characteristic enthusiasm he began the pursuit—"We saw her cross the plain towards the west, and hastened to overtake her: she was proceeding at a smart trot, but did not appear to be at all hurried. We galloped after her, but she insensibly gained so much upon us, that after having pursued her for three hours we were forced to stop, because our horses were quite out of breath, and we entirely lost sight of her." Le Vaillant afterwards was more successful.

We have already alluded to the difficulty which the giraffe experiences in putting its lips to the ground, being obliged to set its fore-limbs wide apart; it is indeed an action which it seldom attempts unless induced by some tempting morsel, as, for instance, sugar, of which the giraffes in the gardens of the Zoological Society are very fond, and for which they will follow their attendants, trying to gain possession of it by insinuating their long slender tongue or upper lip into the hands of the person who holds it. In their play we have several times noticed that they strike out with the fore-limbs, and these, as well as the hind-limbs, they use in self-defence, lashing out with rapid and impetuous force. "His defence," says Le Vaillant, "consists in kicks, and his hinder limbs are so light and his blows so rapid, that the eye cannot follow them;" and "I know beyond a doubt that by its kicking it often tires out, discourages, and even beats off the lion." After his dogs had brought an individual to bay, they dared not make an attack, as it defended itself "with a succession of rapid kicks." Major Gordon notices the force with which one which he killed spurned the ground in the agony of death.

Le Vaillant observes that the giraffe never uses its horns in resisting any attack; we have, however, often seen the gentle and beautiful animals in the gardens of the Zoological Society, while playing with each other, swing the head round and butt with the horns; but in earnest self-defence we may easily believe that this mode would never be adopted. While speaking of these individuals, we may state that they often take each other's mane between the lips, and appear to nibble it as they pass their mouth along its course. They are extremely confiding in disposition: the presence of strangers is far from giving them annoyance; they gaze with calmness on the crowd of admirers around them, and bend their necks down as if to contemplate them more closely, or in order to solicit some delicacy.

In its native wilds, man excepted, the lion is the only enemy to be feared by the giraffe; and from various sources we learn the lion often surprises the latter when he comes to drink at the pools or fountains, and springs from his ambush upon the tall and powerful beast, which, mad with terror and pain, rushes over the desert, bearing the "great destroyer," till, strength failing, he reels, sinks, and expires.

According to M. Thibaut, the Arabs of Nubia are very fond of the flesh of the giraffe; and he himself partaking of the repast (viz., broiled slices), found it to be excellent. In South Africa its flesh is equally acceptable.

The height of the male giraffe to the top of the head is from fifteen to sixteen feet, of the female from thirteen to fourteen. The general colour is fawn-white, marked regularly with large angular spots of chocolate-brown, compacted rather closely together; the throat and legs are white; the tuft at the end of the tail black; the hair is close and glossy. The South African variety is generally darker than the Nubian. The specimens presented by Mr. Burchell to the British Museum came from Kosi Fountain, and of these the female is lighter coloured than the male. A specimen from Central Africa, presented by Colonel Denham, is young, and the spots are fawn-coloured on a white ground.

In the Museum at Paris is a very young giraffe, about four feet seven or eight inches in total height, of a uniform mouse-colour, the hair being remarkably close and fine, resembling the nap of velveteen; the place of each horn is indicated by a tuft of black hairs. The Nubian giraffes in the Zoological Gardens differ in the intensity of their colour, one of the males being of a lighter tint than the other.

The period of gestation is about sixteen months. (See 'Proceeds. Zool. Soc.,' 1839, p. 108.)

In a state of confinement the giraffe eats hay, carrots, and onions, to the latter of which it is very partial. We have never heard these animals utter any noise or cry, nor do travellers make any mention of their voice. The giraffe shot by Colonel Gordon, to which we have already alluded, when so wounded as to be incapable of rising from the ground, exhibited no signs of anger or resentment, nor is it stated to have made any moan. Hence we conclude that the giraffe is mute.

---

* 'Diversum confusa genus Panthera Camelo.'
Horace, *Epist.* ii. 195.

* Mr. Patterson was sent to the Cape as botanist by Lady Strathmore, and he brought to this country the first entire skin of a giraffe on record. Lady Strathmore gave it to the celebrated John Hunter, in whose museum it was preserved. Afterwards the trustees of the Royal College of Surgeons transferred the skin to the British Museum. Its condition is very bad, the hair being almost all off the skin: yet as a sort of historical monument in the department of Zoology, it is worthy of preservation.

Family *Moschidæ*.—Linnæus gave the title *Moschus* to a group of Ruminants, from the circumstance of one of the species producing that well-known substance called musk, the secretion of a peculiar glandular pouch in the abdomen of the male, for the sake of which the animal is eagerly hunted in the regions it frequents, namely, the high mountain-ranges in China, Thibet, Tonquin, Pegu, and also Southern Tartary. The musk-deer, however, is the only known species of this group in which this secretion is produced. The Moschidæ closely resemble the deer in general form and appearance; but they resemble them in miniature, for with the exception of the true Musk (M. moschiferus), which equals a roebuck in size and stature, the rest are extremely small, some not exceeding a hare in magnitude. They are extremely beautiful: the eyes are large, dark, and beaming with a mild and animated expression; the head is small and tapers to a slender muzzle; the ears are moderate and open; the haunch elevated and round; and the limbs delicately slender and tapering to narrow-pointed hoofs. The family characters consist in the absence of horns, and also of suborbital sinuses (pits beneath the inner angle of the eye), so conspicuous in many of the deer and antelopes. The muzzle is naked. There are long canines in the upper jaw of the males, projecting downwards, and coming out from between the lips. These canines are compressed, pointed, arched backwards, and have a sharp posterior cutting edge. In the true musk they are at least three inches in length. The crowns of the molars are acutely tuberculated. Fig. 569 represents the teeth of the upper jaw in two views: Fig. 568, those of the lower; Fig. 570, a lateral view of teeth of both jaws together. Besides the two toes united to a single canon-bone, as usual, there are two accessory toes on each foot, each of which has its own slender metatarsal or metarcarpal bone. See Fig. 571, the skeleton of the Moschus moschiferus, and Fig. 572, the skeleton of the Meminna, which are excellent illustrations of their osteology. There are no horns or antlers, nor even their rudiments.

Mr. Gray divides the Moschidæ into three genera, viz., Moschus, Meminna, and Tragulus. The latter title, however, is applied by Mr. Ogilby to a species of antelope (A. pigmæa). Most authors, moreover, adopt the Linnæan genus Moschus, and we shall in this instance follow their example. Setting aside the true Musk, the other members of the genus are termed Chevrotains, and till very recently were supposed to be respectively restricted to Java, Sumatra, Ceylon, and perhaps other adjacent islands: recently, however, to the surprise of naturalists, a species has been discovered in Sierra Leone, to which, from its aquatic habits, Mr. Ogilby has given the title of Moschus aquaticus. (See 'Proceeds. Zool. Soc.' 1840, p. 35.)

573, 577.—The Musk-Deer

(*Moschus moschiferus*). The musk-deer, unlike its relatives which tenant the forests of Ceylon and Java, &c., inhabits the great mountain-range which belts the north of India, and branches out into Siberia, Thibet, and China, through a vast extent of which it ranges, preferring the bold precipitous crags and wild rocks on the borders of the line of snow to the valleys or the lower elevations. It is common to Nepal, Boutan, Thibet, and the adjacent districts of China. It also abounds in the Altaic range near Lake Baikal, where it was observed by Pallas on the mountains of Kouznetzk, near the lake Telet Koi. The texture and thickness of the fur of the musk-deer sufficiently demonstrate the animal to be the native of a cold and elevated region. The fur is not only full and long, but presents that peculiar harsh or rigid and inelastic texture, which we observe in the chamois, or rather in the Klip-springer of the mountains of South Africa. Instead of lying flat on the skin, it grows erect, and is so closely set as to form a dense substantial covering. Common as is the musk-deer in the great alpine ranges of Asia, nevertheless it does not appear to have been known to the ancients, a circumstance doubtless to be attributed to the almost inaccessible nature of the regions it frequents. Neither Aristotle nor Pliny mentions either the animal or its celebrated produce. It is from the male only that the drug and perfume termed musk is procured; it is the unctuous secretion of a certain glandular pouch, and when dry it becomes dark brown or black, and somewhat granular. Its peculiar odour is well known. Formerly it was in high repute for its medicinal qualities, and still holds a place as an antispasmodic in the Materia Medica. It was first, as we learn, introduced into the practice of medicine among the Arabians, by whose writers the animal producing it is first distinctly mentioned; having, as Daubenton states, been described by Serapion in the eighth century: but we know not the time when this article first found its way to Europe; probably after the early Crusades. In Boutan, Tonquin, Thibet, &c., it appears from time immemorial to have been used as a medicine and perfume, and to have formed an article of trade amongst the inhabitants of those countries. Abusseid Serafi describes the musk-deer as an animal resembling the roe, but erroneously assigns to it horns, in which error he is followed by Aldrovandus. Among other Arabian writers who notice this animal is Avicenna, who refers to its musk-pouch and large bent canines. Kircher ('La Chine illustrée,' Transl. Franç., 1610) gives an account of the musk-deer which is found in the provinces of Xensi and Chiamsi: he quotes several details respecting it from the Chinese Atlas, whence we learn that the Chinese term it Xe, which means odour; that its flesh is accounted delicate; and that it abounds in the provinces of Suchuen and Junnan. In some districts the musk-deer is very common, and multitudes are slaughtered for the sake of their costly perfume; which, however, is always greatly adulterated. To the practice of adulterating it the celebrated merchant-traveller Tavernier alludes, adding that the odour of the substance when recent is so powerful as to cause the blood to gush from the nose. Chardin says, "It is commonly believed that when the musk-sac is cut from the animal, so powerful is the odour it exhales, that the hunter is obliged to have the mouth and nose stopped with folds of linen, and that often, in spite of this precaution, the pungency of the odour is such as to produce so violent an hæmorrhage as to end in death. I have," he adds, "gained accurate information respecting this circumstance; and as I have heard the same thing talked of by some Armenians who had been to Boutan, I think that it is true. The odour is so powerful in the East Indies that I could never support it; and when I trafficked for musk, I always kept in the open air, with a handkerchief over my face, and at a distance from those who handled the sacs, referring them to my broker; and hence I knew by experience that this musk is very apt to give headaches, and is altogether insupportable when quite recent. I add, that no drug is so easily adulterated, or more apt to be so."

These accounts must be taken, we suspect, with some allowance. Certain it is that, when procured in Europe in the ordinary way of commerce, it produces no such violent effects. It must be confessed, however, that before arriving in Europe, not only much of its strength is lost, but it has undergone several adulterations.

Tavernier states that the musk-deer is very numerous in the sixtieth degree, among the wooded mountains, whence in February and March, when the snows have deeply covered the earth, hunger drives them southward into the lower lands, to the forty-fourth or forty-fifth degree, in search of herbage. At this season the peasants wait for them on their passages, and catch them in snares, or kill them with clubs and arrows. At Patana he bought on one occasion 1673 musk-bags, weighing 2557½ ounces, and of pure musk 452 ounces.

In size the musk-deer is about equal to our European roebuck, standing two feet in height at the shoulders; the forehead is arched, the eyes large, the ears rather ample, and very moveable; the tail is a mere rudiment, concealed by the long, harsh, and almost spine-like hair with which the animal is universally covered. The general contour is compact, and displays great vigour, the limbs being robust, and well adapted for climbing and leaping among the rocks of the mountain ranges. The hoofs are strong, broad, and expanded; and the posterior rudimentary hoofs are so developed as to touch with their points the surface on which the animal treads, so as to add to the security of its footing.

The general colour of the musk-deer is brown, washed with grey and pale yellow, each hair being tipped with ferruginous; obscure grey or whitish marks often occur on the sides, especially in immature individuals; the shoulders and limbs are of a deeper tint than the body. The female is less than the male, and is destitute of tusks or long canine teeth, and of a musk-sac. The teats are two in number. In its manners the musk-deer resembles the chamois: its favourite haunts are the pine-forests on the mountains, and its agility is very great, enabling it to spring from rock to rock with great ease and address. It is extremely wild and shy, and is said to be cautious and watchful against surprise, taking refuge, when pursued, among the crags and precipices of the more elevated peaks of the ranges it tenants; yet, in despite of all its vigour and shyness, it falls a sacrifice to the energy and the contrivances of man.

In 1772 a male of this species was living in the park of Mons. de la Vrillière, at Versailles, in France; and Daubenton, who published a description of it, informs us that the odour it exhaled, and which was carried with the wind, was quite sufficient to guide to the spot where the animal was kept enclosed. "When I first saw it," he adds, "I recognised much resemblance in its figure and attitude to those of the roe, the gazelle, and the chevrotain. No animal of this (the deer) tribe has more activity, suppleness, and vivacity in its movements." It was extremely timid and wild; but like all the species of the peculiar group to which it belongs, it is gentle and inoffensive. The chevrotains, as we well know, may be rendered very tame: and it is probable that if the musk-deer were taken while young, it might be easily domesticated, since the former animals are shy and timid in the extreme while in a state of natural freedom, but soon gain confidence, and have even bred in captivity in our uncongenial climate.

A good figure of the musk-deer is given by Buffon in the 6th vol. of his Supplement.

574.—The Meminna

(*Moschus Meminna*). This elegant little species is a native of Ceylon and Java, and is also found in considerable numbers in the dense woods of the Western Ghauts (but never on the plains), where it was seen by Colonel Sykes, who observes, that it readily reconciles itself to confinement: the flesh is excellent eating. In size it exceeds a large hare, being about one foot five inches long, and eight inches high. Its colour is olive-grey, spotted and streaked on the sides and haunches with white; the ears are large and open; the tail is very short.

575.—The Napu

(*Moschus Javanicus*). The species constituting the little section of which the Napu is a representative, are characterised by having the hinder edge of the metatarsus bald and slightly callous: the throat is provided with a somewhat naked concave subglandular callous disc, from which a band extends to the fore part of the chin; and most of them have three diverging bands of white on the chest. The animals of this group are distinguished by their beauty and diminutive size, the largest not equalling a hare. Their limbs are very slender and delicate; their hoofs are long and narrow; the muzzle is acute; the eyes large and dark; the ears pointed.

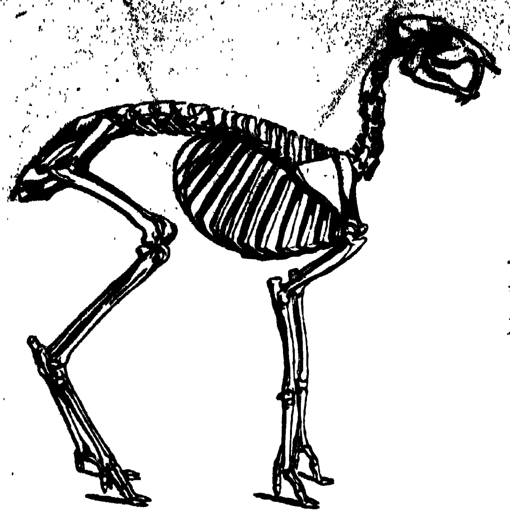
The species are enveloped in some degree of confusion; indeed they resemble each other so closely, that it requires some attention to discriminate between them. Mr. Bennett, who investigated these animals with the greatest care, considered that three species were defineable, viz., the Napu, the Kanchil, and the Pelandok; the two former of which are described by Sir T. S. Raffles, in the 'Linn. Trans.' vol. xiii. Mr. Gray considers the Pelandok to be in all probability identical with a species described by him under the specific title of Rufiventer, and adds another species to the group under the designation of Stanleyanus—of this species a pair bred in the gardens of the Zool. Society.

The napu is a native of Jave and Sumatra, and is the largest of this section; its colour is ferruginous brown above and white beneath, the chest having two longitudinal dusky stripes, so as to produce a central and two diverging lateral lines of white, below which passes a transverse band of pale yellowish fawn. The muzzle, which is naked, is black, with a tinge of flesh colour, as are the ears, which are also nearly naked. The tail is rather short, and white at the tip. In its native regions the napu gives preference to thickets and districts overgrown with brushwood, near the sea-shore, and feeds principally on the berries of a species of Ardisia. It is said to be inferior to the kanchil in speed, activity and cunning, and is therefore more exposed to danger from the assaults of wild beasts, which abound in the forest; and hence it prefers to lurk in coverts nearer the vicinity of man, from whose observation it can more easily conceal itself than from the watchful eyes of the feline race.

In its manners the napu is mild and gentle, and soon becomes reconciled to captivity: it bears our climate well, with care; though destitute of marked intelligence, its graceful form, agreeable colouring, and full dark eyes render it an interesting object.

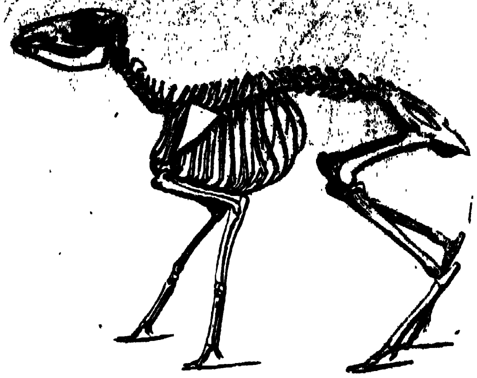
576.—The Kanchil

(*Moschus Kanchil*, Raffles). The Kanchil is lighter in form and more spirited than the napu, and considerably smaller. Independent of the difference in size, it is easily distinguished by its darker colour, by a broad stripe of dark chestnut verging upon black, which runs down the back of the neck, and by the width of the band across its chest. Of all the chevrotains this is the most active and elegant; indeed its address and resolution are the common theme of discourse in Java, its native country; and the most extraordinary instances are related of its cunning. Unlike the napu, it resides in the depths of the mighty forests which cover so large a portion of the island, feeding chiefly on the fruit of the Kayo-briang (Gmelina villosa): and though it will live in confinement, it endures captivity with great impatience and restlessness, availing itself of the first opportunity of escape



571.—Skeleton of Musk Deer.

575.—Napu.



572.—Skeleton of Meminna.

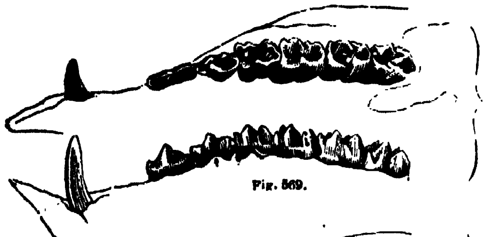


Fig. 569.

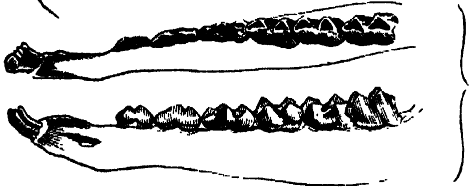


Fig. 568

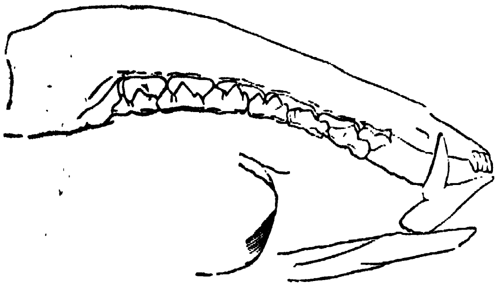
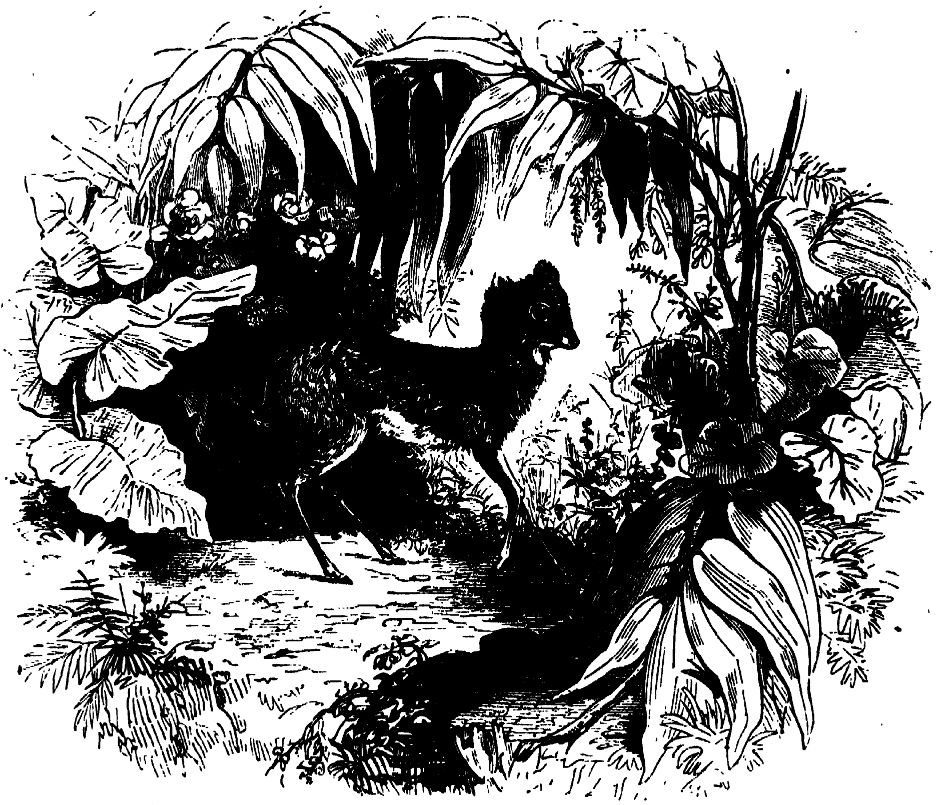
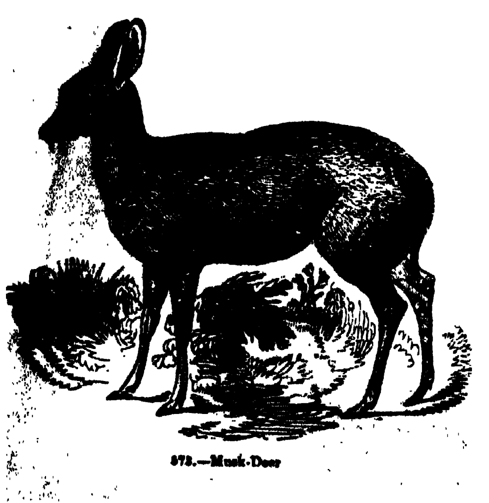


Fig. 570.



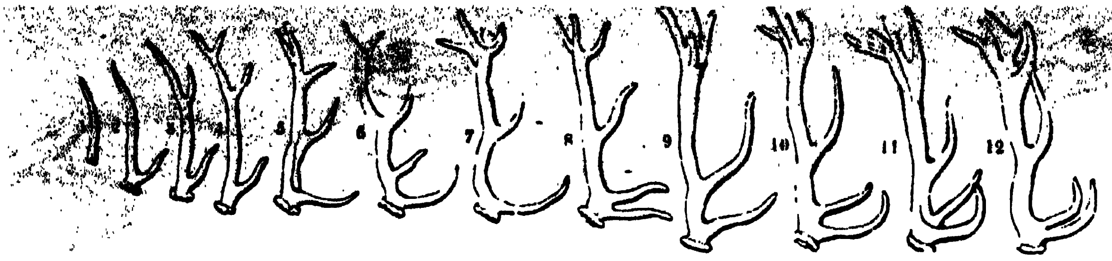
576.—Kanchil.



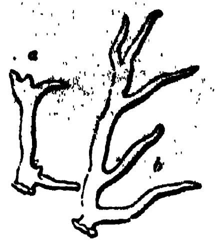
573.—Musk-Deer

578.—Horns of Fallow Deer.

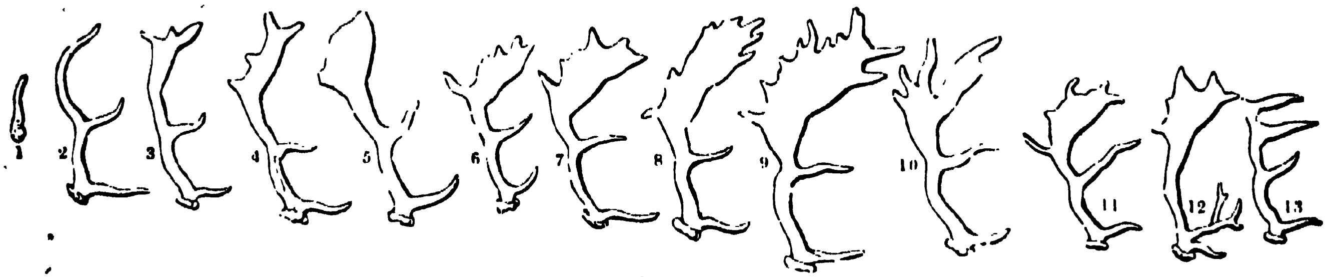
574.—Meminna.



579.—Stag's Horns.

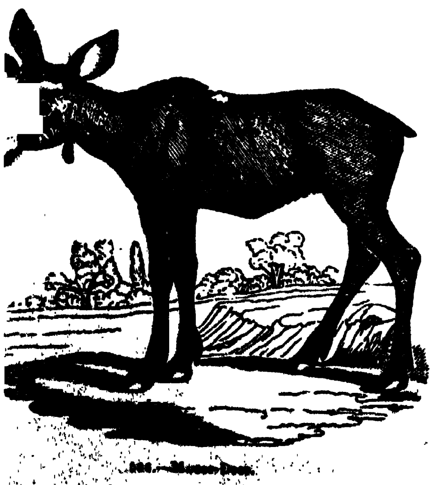


580.—Horns of Wapiti.



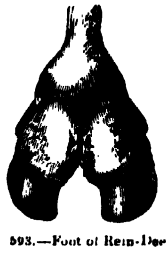
581.—Horns of Fallow Deer.

577.—Musk-Deer.



596.—Moose-Deer.

592.—Foot of Rein-Deer.



593.—Foot of Rein-Deer.

594.—Insects which attack Rein-Deer.

595.—American Elk.

that offers, when it bounds away for the forest, the deep recesses of which afford it a welcome refuge. Such are its cunning and alertness, and so prompt is it with expedients when pressed by danger, that, as Sir Stamford Raffles informs us, "it is a common Malay proverb, to designate a great rogue to be as cunning as a kanchil;" and he adds, of this cunning many instances are related by the natives. "If taken in a noose laid for it, the kanchil, when the hunter arrives, will stretch itself out motionless, and feign to be dead; and if, deceived by this manœuvre, he disengage the animal, it seizes the moment to start on its legs, and disappears in an instant. A still more singular expedient is mentioned, viz. that when closely pursued by dogs, the kanchil will sometimes make a bound upwards, hook itself on the branch of a tree by means of its bent tusks, and there remain suspended till the dogs have passed beneath." In vigilance, activity, and cunning, if these statements be but partially true, the kanchil surpasses the rest of the group, none indeed, excepting this, have gained a reputation for these qualities, though all are light-limbed, free, and vigorous.

Among the species to be erased from the genus Moschus, are the Guevi, or pigmy antelope, or Senegal (Antilope pigmæa), regarded by Buffon as a chevrotain; and the Moschus Americanus, and M. delicatulus of South America, which are the young of one of the deer of that country. The Moschus pygmæus, Linn., is the young of an antelope. The Moschus Guineensis, Brisson and Gmelin, is also most probably the young of an antelope. As we have said, however, Africa produces one species at least of the genus Moschus, of which a perfect skin and skeleton are in the museum of the Zool. Soc. Lond.

The African musk-deer (Moschus aquaticus, Ogilby, 'Proceeds. Zool. Soc.' 1844, p 35) very much resemble the meminna, but is larger, being about midway in size between that species and the Moschus moschiferous. Its general colour is a deep rich brown, with white spots and markings, nearly similar to those of the meminna, but with the throat-marks as in the napu or kanchil. This interesting species is a native of Sierra Leone, where it lives on the borders of rivers, and takes [illegible]ly to the water.

CERVIDÆ, OR THE DEER TRIBE

The animals of this great group, celebrated for their beauty, vigour, and speed, are spread very extensively, each quarter of the globe having its own peculiar species. To this universality of distribution there are, however, certain exceptions, none are found in Australia, and none in the southern and central regions of Africa, their place in the latter regions being supplied by the giraffe and hosts of antelopes. Hills of moderate elevations, wide plains, and forests, are the localities to which these fleet-limbed creatures give preference, none tenant the peaked ridges of the mountain-top, where the chamois and musk-deer find a congenial abode. They delight in a wide range of country, and trust to their swiftness of flight for safety. Most herd together in troops; some few live singly. It may be observed that, in general, their body is round and stout, their limbs long, sinewy and powerful, their neck long, and very muscular; their head small, and carried high, their eyes large and full, their ears ample.

Many species have suborbital sinuses (or lachrymal sinuses), but not all. With respect to these sinuses, or fissures below the eyes, in so many both of the deer and antelopes, we may here remark that their use is not understood: they have nothing to do with respiration, being mere follicles or pits in the skin, having no communication with the interior of the nasal passages. They secrete a peculiar unctuous fluid, exuding more abundantly at certain seasons than at others, when their edges become very tumid, and are incapable of being closed together as at other times. The animals often apply them to objects near them, widely opening them at the same moment, which they do also when irritated or under excitement. In several species they are greatly developed, and no doubt serve some important purpose in the animal economy. In most species the muzzle, which is small, is flat and naked; in some, as the elk and rein-deer, it is large and hairy, and the upper lip is prehensile. The females have four teats.

Throughout all the species the males are furnished with antlers, commonly called horns, which are lost and renewed yearly, increasing in the size, and the number of their branches, at each renewal until a certain period. They are seated upon an osseous peduncle or footstalk rising from each frontal bone, at its central point of ossification: these peduncles are enveloped in skin. It is not till the spring, or beginning of the second year, that the first pair of horns begin to make their appearance. At this epoch a new process commences; the skin enveloping the peduncles swells, its arteries enlarge, tides of blood rush to the head, and the whole system experiences a fresh stimulus. The antlers are now budding, for on the top of these footstalks the arteries are depositing layers of osseous matter, particle by particle, with great rapidity; as they increase the skin increases in an equal ratio, still covering the budding antlers, and continues so to do, until they have acquired their due development and solidity. This skin is a tissue of blood-vessels, and the courses of the large arteries from the head to the end of the antlers are imprinted on the latter in long furrows which are never obliterated. In ordinary language, the skin investing the antlers is termed velvet, being covered with a fine pile of close short hair. Suppose, then, the antlers of the young deer now duly grown, and still invested with this vascular tissue; but the process is not yet complete. While this tender velvet remains the deer can make no use of his newly-acquired weapons, which are destined to bear the brunt of many a conflict with his compeers: it must therefore be removed, but without giving a sudden check to the current of blood rolling through this extent of skin, lest by directing the tide to the brain, or some internal organ, death be the result. The process then is this:—as soon as the antlers are complete (according to the age of the individual), the arteries at their base, where they join the permanent footstalk (always covered with skin), begin to deposit around it a burr, or rough ring of bone, with notches, through which the great arteries still pass. Gradually, however, the diameter of these openings is contracted by the deposition of additional matter, till at length the great arteries are compressed as by a ligature, and the circulation is effectually stopped. The velvet now dies for want of the vital fluid, it shrivels, dries, and peels off in shreds, the animal assisting in getting rid of it by rubbing his antlers against the trees. They are now firm, hard, and white, and the stag bears them proudly, and brandishes them in defiance of his rivals. From the burr upwards, these antlers are now no longer part and parcel of the system; they are extraneous, and held only by their mechanical continuity with the footstalk on which they were placed; hence their deciduous character, for it is a vital law that the system shall throw off all parts no longer intrinsically entering into the integrity of the whole. An absorptive process soon begins to take place just beneath the burr, removing particle after particle, till at length the antlers are separated and fall by their own weight, or by the slightest touch, leaving the living end of the footstalk exposed and slightly bleeding. This is immediately covered with a pellicle of skin, which soon thickens and all is well. The return of spring brings with it a renewal of the whole process with renewed energy, and a finer pair of antlers branches forth.

The common stag begins to acquire his antlers in the spring, and loses them early in the spring succeeding. His first antlers (second spring) are straight, small, and simple: he is now termed a Brocket. The next pair are larger, and have a brow antler directed forwards from the main stem, sometimes with one or two small branches above. The third pair of antlers has two forward stem branches besides the brow antlers, and one or two snags at the top. The fourth pair have the brow and stem antlers increased and more snags, the fifth and sixth pairs exhibit still greater development, and an increase in the number of snags. Any disturbance in the system produces a corresponding deterioration in the form and proportions of the horn. Our figures develop the progress of the successive annual horns in the stag or red deer, and in the fallow deer. The horns are from the left side.

Fig 579 (Stag) —1, Horn of first growth; 2, 3, 4, ditto of second, 5, 6, of third and fourth, 7, of fifth, 8, 9, of the sixth growth, 10, 11, 12, the seventh and subsequent growths, the horns being at their maximum. Fig. 580 represents horns of the Wapiti deer: *a*, horn produced in unfavourable circumstances, in confinement, *b*, horn of the same animal the year afterwards, and finely branched. Fig. 581 (Fallow-deer).—1, Horn of the first growth, 2, 3, 4, horn of the second; 5, 6, 7, horns of the third growth, 8, 9, horns of the fourth; 10, 11, 12, 13, horns of the fifth and sixth growth. Fig. 578 shows the horns of a fallow-deer in an unnatural state, and not shed at the proper time (Cervo evirato).

The Cervidæ are divided by Col. Hamilton Smith into the following sections, which many naturalists have adopted, and which seem to us very natural. 1, Alce, or the Elk group; 2, Rangifer, or the Rein-deer group; 3, Dama, or the Fallow-deer group; 4, Elaphus, or the Stag group; 5, Rusa, or the Sambur deer group; 6, Axis, or the Axis-deer group; 7, Capreolus, or the Roebuck group, 8, Mazama, or the American Fallow group; 9, Sabulo, or the Guazu or Brocket group of America; 10, Stylocerus, or the Muntjacks.

1. Alce.—Horns sessile, more or less subdivided, without either basilary or mesial antlers, but terminated by a vast palmation, designated on its external border only.

585, 586.—The American Elk, or Moose-Deer.

(*Alces Americanus; Cervus Alces*, Linn.). The Elks are the largest of the Cervidæ, and are distinguished by the broad palmation of their antlers, furnished with numerous digitations on their outer edge only; a large isolated branch springs from the stem, which latter is thick and short, and begins immediately to expand, the head is heavy, the ears large and open the eyes small and dull; the muzzle elongated, thick, projecting, pendulous, and flexible —it is covered with hair. Two small pendulous dewlaps of loose skin hang from the throat; the neck is short and thick, the body strong and short; the limbs are long and awkward; the toes are broad, and divided so high that they diverge as the animal presses them to the ground; the tail is extremely short, the hair is full, harsh, long, and produced on the neck and shoulders into a mane.

It has been considered by many naturalists, that the American Elk and the European Elk are specifically identical, it is probable, however, that they are distinct. The European Elk is spread but thinly through the wild forest-regions of Norway, Sweden, part of Prussia, Lithuania, and Russia, from the fifty-third to the sixty-third degree of latitude. It extends also through Asiatic Tartary to the north of China. Buffon supposes that the Greeks were unacquainted with this animal, and it does not appear to have been noticed by Aristotle. That it was the ἄλκη, Alce or Alces, of Pausanias, Cæsar, and Pliny, there can be no doubt. The word Alce or Alchis is merely the Celtic Elch or the Scandinavian Ælg modified. In book viii. ch xvi. Pliny gives an account of the Alce, which he distinguishes from the Alchis, regarding them at the same time as allied animals: but it is easy to see through his error; his account of it walking backwards while feeding, in consequence of its overhanging lip, and his statement that there is no joint at the hock, we need scarcely say are fabulous. According to Mr. Lloyd ('Field Sports of the North of Europe') the elk is far less common than formerly, and restricted only to certain districts. It frequently attains the height of seven and even eight feet, but does not attain to full growth till about the fourteenth year. A young elk two years old, in the possession of Mr. Wise, the Swedish consul-general, measured upwards of six feet at the shoulder. "By nature," says Mr. Lloyd, "the elk is timorous and he usually flies at the sight of man. At certain seasons, however, like other animals of the deer kind he is at times rather dangerous. His weapons are his horns and hoofs, he strikes so forcibly with the latter, as to annihilate a wolf or other large animal at a single blow. It is said that when the elk is incensed the hair on his neck bristles up like the mane of a lion, which gives him a wild and frightful appearance. The usual pace of the elk is a high shambling trot, and his strides are immense, but I have known him, when frightened, to go at a tremendous gallop. In passing through thick woods he carries his horns horizontally, to prevent them from being entangled in the branches, from the formation of his hoofs, he makes great clattering, like the rein-deer when in rapid motion. In the summer season the elk usually resorts to morasses and low situations, for, like other animals of the deer kind, he frequently takes to the water in warm weather, he is an admirable swimmer. In the winter time he retires to the more sheltered parts of the forest, where willow, ash, &c, are to be found, as from the small boughs of these trees he obtains his sustenance during that period of the year. In the summer and autumn the elk is often to be met with in small herds, but in the winter there are seldom more than two or three in company. At the latter season, indeed, he is frequently alone. The flesh of the elk, whether fresh or smoked, is very excellent. the young are particularly delicious. The tongue and the nose are thought to be great delicacies in Scandinavia as well as in America. Great virtue was once placed in the hoof of that animal; but this idle notion must, by this time, I should think, be nearly exploded. The skin is convertible to many purposes, and is very valuable. Mr. Grieff says—'It is not long since that a regiment was clothed with waistcoats made from the hides of those animals, which were so thick that a ball could scarcely penetrate them.' The elk is easily domesticated. Formerly these animals were made use of in Sweden to draw sledges, but, owing as it was said, to their speed frequently accelerating the escape of people who had been guilty of murders or other crimes, the use of them was prohibited under great penalties. Though I apprehend these ordinances, if not abrogated, are obsolete, I am not aware that the elk is ever made use of in that kingdom at the present day, either to draw a sledge or for other domestic purposes. In Sweden, it is contrary to law at this particular time to kill the elk at any season of the year: this is not the case in Norway; for in that country, these animals may be destroyed, with certain limitations as to numbers, from the 1st of July to the 1st of November inclusive. The penalty however for killing an elk out of season, in Norway, is very much heavier than in Sweden; it amounts indeed including legal expenses, &c, to about 20*l*, which is no inconsiderable sum in that kingdom" (Lloyd, *Northern Field Sports*, vol ii, p 329, et seq)

Immediately following the passage above quoted there is a very interesting account of the mode of hunting the elk, in Scandinavia, upon "skidor," or snow skates, interspersed, as most of such narratives are, with notices of the habits of the animal, but as our limits will not permit its insertion, we refer the reader to the work, which is well worthy of his attention

The American Elk, or Moose-deer (Mousoa of the Crees, Mongsoa of the Algonquins Dennai of the Chippewyans), presents the same habits and manners as the Elk of Scandinavia Formerly its range was more extensive than at present Dr Richardson, in his 'Fauna Boreali Americana,' says "Du Pratz informs us that in his time the moose deer were found as far south as at Ohio and Denys says that they were once plentiful in the island of Cape Breton though, at the time he wrote they had been extirpated At present according to Dr Godman, they are not known in the state of Maine, but they exist in considerable numbers in the Bay of Fundy They frequent the woody tracts in the fur countries to their most northern limit. Several were seen on Captain Franklin's last expedition, at the mouth of the Mackenzie, feeding on the willows which, owing to the rich alluvial deposits on that great river extend to the shores of the Arctic Sea lat 69 Farther to the eastward towards the Coppermine River, they are not found in a higher latitude than 65°, on account of the scarcity on the barren grounds of the aspen and willow, which constitute their food Mackenzie saw them high up on the eastern declivity of the Rocky Mountains but I suspect they are rarely, if ever, found to the westward of the mountains" The moose-deer appears to be a solitary animal, at least in the more northern latitudes the older writers speak of it as being found in small herds, but there is room for suspicion that the moose and wapiti are confounded together From its exquisite sense of hearing, and habitual wariness the chase of the moose-deer is very difficult indeed as Dr Richardson states, "The art of moose hunting is looked upon as the greatest of an Indian's acquirements, particularly by the Crees, who take to themselves the credit of being able to instruct the hunters of every other tribe In summer the moose is so tormented by mosquitoes, that he becomes, to a certain degree, regardless of the approach of man but in winter, when the ground is covered with snow, in which the hunter tracks the animal by its footmarks, it requires the greatest caution to get within gun-shot The slightest noise, the rustling of a leaf, or the cracking of a twig is sufficient to give the alarm and disappoint the hopes of the hunter Nor is the chase always unattended with danger, for if the animal be an old male, and the shot does not bring him down, he will often turn infuriated on his enemy, who is then obliged to shelter himself behind a tree and Dr Richardson observes, that he has heard of several instances in which the enraged animal has completely stripped the bark from the trunk of a large tree by striking with his fore-feet On firm snow owing to the spread of its hoofs, which make a loud crackling noise at each step, the moose can sustain a lengthened pursuit, Captain Franklin records an instance of a chase kept up by three hunters for six successive days, until the track of the animal was marked with blood On the fourth day the chief hunter sprained his ankle, and the others were tired out, but one of them, after a rest of twelve hours, followed up the game, which after a chase of two days more he succeeded in killing The moose is often killed by the Indians while crossing rivers, and the young, as Herne states are so simple as to allow an Indian to paddle his canoe up to them he has seen an Indian take one by the poll without experiencing the least opposition, "the poor animal swimming at the same time alongside the canoe as if swimming by the side of its dam, and looking up in our faces with the same fearless innocence that a house-lamb would, making use of its fore-foot almost every instant to clear its eyes of mosquitoes, which at that time were remarkably numerous The moose is the easiest to tame and domesticate of any of the deer kind."

From the length of its limbs and the shortness of its body, the moose shuffles or ambles along, and when it is at full speed the hind-feet straddle to avoid treading on the fore-heels, which sometimes happens so as to trip it up. During its progress it raises its head horizontally in order to throw the horns upon the withers. The moose does not attemp to leap but steps easily over a fallen tree or any other obstacle It swims with ease and rapidity, and is very fond of the water, in which it often remains immersed for a whole day in hot weather, in order to escape the attacks of the mosquitoes, and leisurely browses upon the twigs within its reach The shortness of the neck, the length of the limbs and the formation of the upper lip combine to render the moose a browsing animal the shoots of the willow and birch are a favourite food, it is particularly partial to the red willow (Cornus alba) and also according to Lewis and Clark to the evergreen leaves of the Gaultheria shallon Its skin, when dressed, forms a soft and pliable leather, excellently adapted for moccassins

Destitute as is the elk of the grace and compactness of form so conspicuous in the stag it is nevertheless a noble and striking animal those who have contemplated it amidst the wilds of its native regions describe the effect of its appearance as very imposing

2 RANGIFER Antlers flattened

587 to 591 THE REIN DEER

(*Rangifer Tarandus Cervus Tarandus* Linn *Cervus Rangifer*, Brisson) The rein deer presents the following characteristics, which form good grounds of separation from the other sections Both sexes possess horns and canine teeth the muzzle is covered with hair, excepting that there is a small naked space between the nostrils the indication as it were of the naked muzzle which we find in the succeeding groups The nostrils are oblique and oval The head is somewhat large and long the neck is short and thick and carried horizontally The horns, especially in old males are of great size, but present considerable variation of figure They may be described in general terms as consisting each of a long slender compressed stem inclined backwards with an outer and upward sweep a brow antler sometimes found only on one horn sometimes on both advances forward assuming a vertical palmated form and hanging over the muzzle this plate usually terminates in digitations sometimes however it is plain A second antler rises at some distance above the brow antler and ascends upwards assuming at its extremity either a palmated form or dividing into two or three small branches Besides these one or two snags rise from the main stem which generally terminate palmated with deep digitations

The feet are deeply fissured when pressed to the ground they spread when raised up they close together and if the animal be in quick motion with a smart snap (Fig 592 represents the hoofs closed Fig 593 the hoofs expanded) The hoofs are round and very concave beneath, with sharp edges the accessory toes are much developed The fur consists of two sorts a soft close underwool and an outer covering of close harsh brittle erect hairs, which are elongated beneath the neck so as to hang down like a fringe The limbs are short and muscular the shoulders and neck very powerful the body firmly built and the whole contour of the frame is such as eminently qualifies the animal for the service of the Laplander

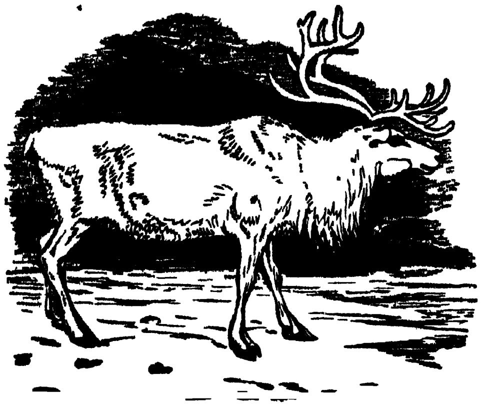
The rein deer is spread throughout the Arctic regions of Europe Asia, and America the wilds of the polar circle being its congenial abode The finest animals are those of Finmark Lapland and especially Spitzbergen those of Norway and Sweden being inferior in strength and stature In Asia it extends farther to the south than in Europe ranging along the Ural chain to the foot of the Caucasian mountains it is common through the northern latitudes of Siberia and abounds in Kamtschatka In America where it is termed the Caribou, it is most numerous between the sixty third and sixty sixth degrees of latitude its most southern limit being about 50°

It has been a question whether the rein deer of Europe, Asia and America are specifically the same or distinct we are inclined to regard them as varieties of one species but are aware that in the opinion of some zoologists there are two distinct species, as indicated by the form of the skull in the Old World and that the American rein-deer is again distinct indeed it is a question whether in America there be not two species, certainly there are two well marked varieties The decision of points like these is, however, alien to our present object

The rein deer (we allude more expressly to the European animal, though the remarks apply to that of Asia and America) is eminently migratory in its habits, and herds in troops, which travel from the woods to the open hills and back again, according to the season. The woods are their winter refuge; here they subsist on the long pendent lichens which hang in festoons from the trees, on the white lichen which covers the ground, and on the twigs of the birch and willow With the return of spring they begin their migration from the forest to the mountain ranges, partly to obtain their favourite food, but chiefly in order to escape the myriads of mosquitoes, and especially from the gad-fly (Œstrus Tarandi), which now begins to appear the latter being greatly dreaded by the rein-deer, the fly not only tormenting it with its sting (ovipositor), but placing its egg in every wound it makes Fig 594 represents this formidable insect So imperative is the instinct that impels the Lapland rein-deer to these migratory movements, that it cannot be modified in the domestic race which constitutes the sole wealth of the Laplander, and on which he depends for existence hence he is obliged to lead a semi nomadic life, taking periodical journeys of no ordinary toil from the interior of the country to the mountains which overhang the Norway and Lapland coasts, and back to the interior.

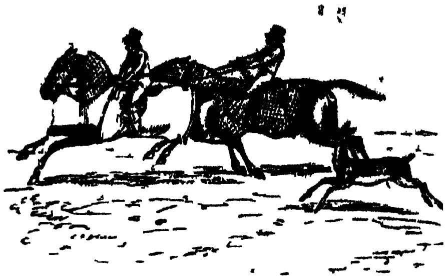
Lapland says Hoffberg is divided into two tracts, called the Alpine and Woodland country. Those immense mountains called in Sweden Fjellen, divide that country from Norway extending towards the White Sea as far as Russia, and are frequently more than twelve miles in breadth The other, called the Woodland division lies to the east of this, and differs from the neighbouring provinces of Norway by its soil which is exceedingly stony and barren being covered with one continued tract of wood of old pine trees This tract has a very singular appearance The trees above are covered over with great quantities of a black hanging lichen, growing in filaments resembling locks of hair, while the ground beneath appears like snow, being totally covered with white lichens Between this wood and the Alps lies a region called the Woodland, or Desert Lapmark of thirty or forty miles in breadth, of the most savage and horrid appearance consisting of scattered uncultivated woods, and continued plains of dry barren sand mixed with vast lakes and mountains When the mosses on part of this desert tract have been burnt either by lightning or any accidental fire the barren soil immediately produces the white lichen which covers the lower parts of the Alps The rein-deer in summer seek their highest parts, and there dwell amidst their storms and snows not to fly the heat of the lower regions but to avoid the gnat and gad fly In winter these intensely cold mountains, whose tops reach high into the atmosphere, can no longer support them and they are obliged to return to the desert and subsist upon the lichens Of these, its principal food is the rein deer lichen There are, says Hoffberg two varieties of this the first is called *sylvestris* which is extremely common in the barren deserts of Lapland and more particularly in its sandy and gravelly fields, which it whitens over like snow its vast marshes, full of tussocks of turf and its dry rocks are quite grown over by it The second variety of this plant, which is less frequent than the former, is named the Alpine this grows to a greater height, with its branches matted together it has this name because when these mountains are cleared of their wood the whole surface of the earth is covered with it yet it is seldom to be found on their tops When the woods become too luxuriant, the Laplander sets fire to them as experience has taught him that when the vegetables are thus destroyed, the lichen takes root in the barren soil and multiplies with fertility though it requires an interval of eight or ten years before it comes to a proper height The Laplander esteems himself opulent who has extensive deserts producing this plant exuberantly when it whitens over his fields he is under no necessity of gathering in a crop of hay against the approach of winter, as the rein deer eats no dried vegetable, unless perhaps the river horsetail (Equisetum fluviatile) They root for this lichen under the snow like swine in a pasture It sometimes happens (but very rarely) that the winter sets in with great rains which the frost immediately congeals, the surface of the earth is then covered with a coating of ice before the snow falls, and the lichen is entirely incrusted and buried in it Thus the rein-deer are sometimes starved, and famine attacks the Laplanders In such an exigence they have no other resource but felling old fir trees overgrown with the hairy liverworts These afford a very inadequate supply even for a small herd, but the greater part of a large one, in such a case, is sure to perish with hunger

With the approach of winter the coat of the rein-deer begins to thicken, and, like that of most polar quadrupeds, to assume a lighter hue. In a domesticated state the animal is subject to a great variety of colour many are white, and mottled individuals are by no means uncommon. Sir Arthur Brooke and other writers notice the strange propensity to devour the lemming (Arvicola Norvegicus, Mus Lemnus, Linn) which this animal often exhibits

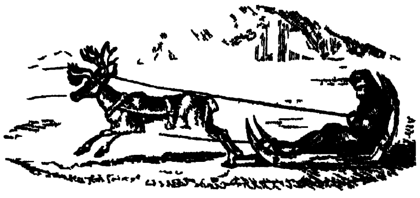


590.—Rein Deer.

[illegible]—Horns of Moose Deer.



[illegible]—Fallow Deer and Horses.



591.—Rein Deer harnessed to a Sledge.

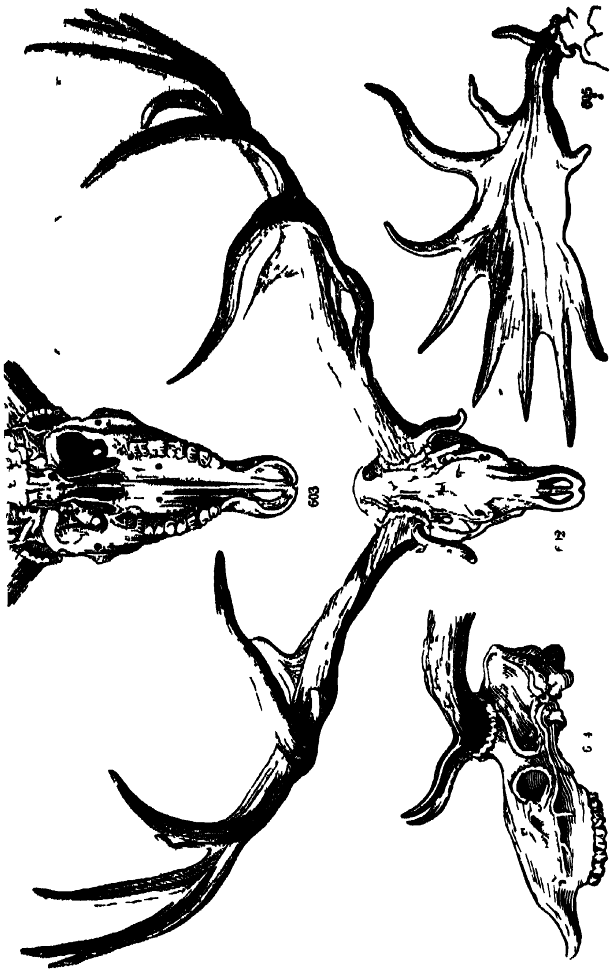
595, 96.—Horns of Caribou.

587.—Milking the Rein Deer.

[illegible]—Rein-Deer and Laplanders.

[illegible]—Fallow-Deer.

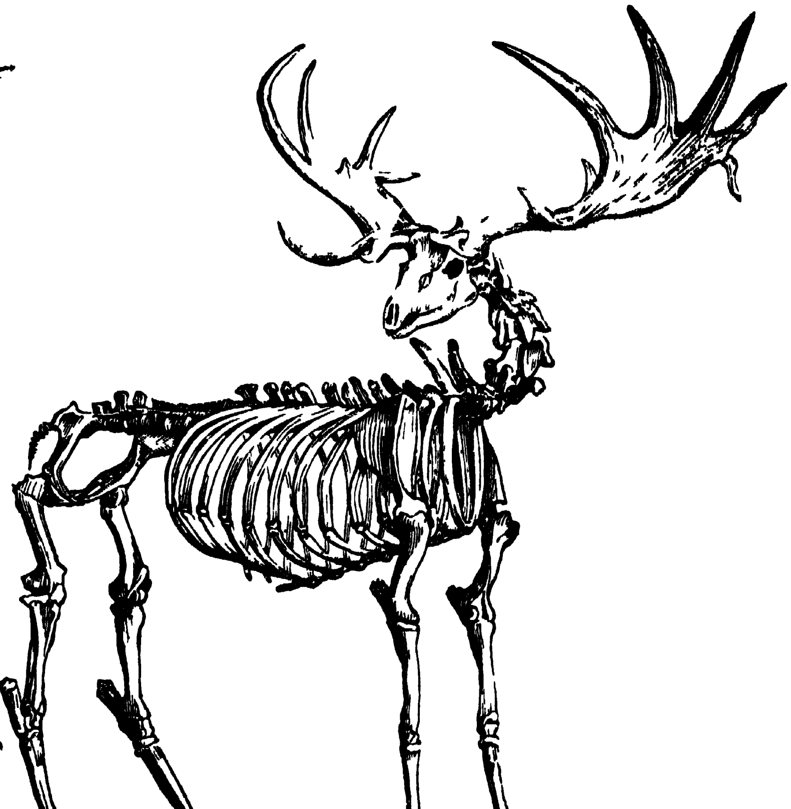
[illegible]—Rein-Deer.



602–605.—Skull and Horns of Fossil Elk.

599.—Group of Fallow Deer.

601.—Skull and Horns of Fossil Elk, Ireland.



600.—Skeleton of Fossil Elk.

and Captain Franklin observes that the American rein-deer "are accustomed to gnaw their fallen antlers, and to devour mice." We cannot account for such an anomaly in the habits of a ruminating animal, otherwise than by attributing it to a morbid appetite. To the natives of Finmark, Lapland, and the shores of the Arctic Sea, the rein-deer is in every sense important: not only is it a beast of burden, but its flesh and milk are alike in requisition. In these countries

> "Their rein-deer form their riches; these their tents,
> Their robes, their beds, and all their homely wealth
> Supply—their wholesome fare, and cheerful cups;
> Obsequious to their call, the docile tribe
> Yield to the sled their necks, and whirl them swift
> O'er hill and dale."

M. de Broke says, "The number of deer belonging to a herd is from three hundred to five hundred; with these a Laplander can do well, and live in tolerable comfort. He can make in summer a sufficient quantity of cheese for the year's consumption, and during the winter season can afford to kill deer enough to supply him and his family pretty constantly with venison. With two hundred deer, a man, if his family be but small, can manage to get on. If he have but one hundred, his subsistence is very precarious, and he cannot rely entirely upon them for support. Should he have but fifty, he is no longer independent, or able to keep a separate establishment, but generally joins his small herd with that of some richer Laplander, being then considered more in the light of a menial, undertaking the laborious office of attending upon and watching the herd, bringing them home to be milked, and other similar offices, in return for the subsistence afforded him."

Von Buch, a celebrated traveller, has well described the evening milking-time, of which a representation is given in Fig. 587. It is a Laplander's summer encampment on the mountains.

Early in September the herds and their owners commence their return from the coast in order to reach their winter-quarters before the fall of the snows; and it is when the winter is fairly set in that the peculiar value of the rein-deer is felt by the Laplander, and his powers called into operation. Without him communication would be almost utterly suspended. Harnessed to a sledge (Fig. 591) the rein-deer will draw about 300 lbs.; but the Laplanders generally limit the burden to 240 lbs. The trot of the rein-deer is about ten miles an hour; and the animal's power of endurance is such, that journeys of one hundred and fifty miles in nineteen hours are not uncommon. There is a portrait of a rein-deer in the palace of Drotningholm (Sweden), which is represented, upon an occasion of emergency, to have drawn an officer with important despatches, the incredible distance of eight hundred English miles in forty-eight hours. This event is stated to have happened in 1699, and the tradition adds, that the deer dropped down lifeless upon his arrival.

In America the rein-deer appears to be as migratory as its Old World relative. Dr. Richardson describes two varieties of this animal inhabiting the northern regions of that continent; the one under the name of the Woodland Caribou (Var. sylvestris); the other under that of the Barren-ground Caribou (Var. Arctica).

The Woodland Caribou (Caribou, of Theodat, La Hontan, Charlevoix, &c.; Rein-deer, of Drage, Dobbs, &c.; Attekh of the Cree Indians; Tantseeah of the Copper Indians, Richardson).—This variety is much larger than the Barren-ground Caribou, but inferior as an article of food. Its proper country is a stripe of low primitive rocks well clothed with wood, about 100 miles wide, and extending, at the distance of 80 or 100 miles from the shores of the Hudson's Bay, from Lake Athapescow to Lake Superior. "Contrary to the practice of the Barren-ground Caribou, the Woodland variety travels to the southward in the spring. They cross the Nelson and Severn rivers in immense herds in the month of May, pass the summer on the low and marshy shores of James's Bay, and return to the northward and at the same time retire more inland the month of September." The weight of the Woodland Caribou varies from 200 to 240 lbs.

The Barren-ground Caribou (Common Deer of Hearne; Bedsee-awseh of the Copper Indians and Dog-ribs; Bedsee-choh (male), Tsootai (female), Tampeh (female with a fawn) of the same; Took-too of the Esquimaux, Took-took dual, Took-toot plural (Richardson); Tukta of the Greenlanders (Pangnek male; Kollowak, female; Norak, young, Fabricius).—This variety (species?) is of small stature, the buck weighing, exclusive of the offal, from 90 to 130 lbs., according to the animal's condition. The herds of the Barren-ground Caribou spend the summer on the coast of the Arctic Sea, and in winter retire to the woods between the sixty-third and sixty-sixth degrees of latitude, where they feed on the Usneæ, Alectariæ, and other arboreal lichens, as well as on the long grass of the swamps. About the end of April they make short excursions from the woods, in order to obtain the terrestrial lichens (Cetrariæ, Cornicularíæ, and Cenomyces), which, now that the snows are partially melted, are both soft and easily to be collected. "In May the females proceed to the sea-coast, and towards the end of June the males are in full march in the same direction. At this period the sun has dried up the lichens on the Barren-grounds, and the Caribou frequents the moist pastures which cover the bottoms of the narrow valleys on the coast and islands of the Arctic Sea, where they graze on the sprouting carices, and on the withered grass or hay of the preceding year, which at that period is still standing and retaining part of its sap. The spring journey is performed partly on the snow, and partly, after the snow has disappeared, on the ice covering the rivers and lakes, which have in general a northerly direction." Soon after their arrival on the coast, the females produce their young. In September the herds begin their return southwards to the forests, which they reach towards the end of October: and are then joined by the males. This retrograde journey is performed after the snows have fallen, but before the heavy frost has set in, so that they are able to procure the lichens, which are still tender and pulpy, by scratching up the snow with their feet, which are well adapted by the concavity of their rounded sharp-edged hoofs for this important purpose. Figs. 595 and 596 are copies of drawings, by Captain Back, of the horns of two old Buck Caribous, killed on the Barren-grounds in the neighbourhood of Fort Enterprise. They are distinguished by their palmations. Dr. Richardson states that he can confidently assert, after having seen many thousands of the Barren-ground Caribou, that the horns of the old males are as much if not more palmated than any antlers of the European rein-deer to be found in the British museums;" which is contrary to Colonel Smith's opinion, that the horns of the Caribou are shorter, less concave, more robust, with a narrower palm, and fewer processes than those of the Lapland rein-deer. So numerous, however, are the varieties of form which the horns of the rein-deer assume, that little stress can be laid upon them as affording distinguishing characters.

It is not only the flesh of the Caribou that is sought after by the Indians, its skin is of great value.

Dr. Richardson informs us, that the skin of the Caribou dressed with the hair on it is so impervious to cold, that if clothed in a suit of this material, and wrapped in a mantle of the same, a person may bivouac all night in the snow with safety during the intensity of the Arctic winter. So closely indeed are the hairs set, that it is impossible, by separating them, to discern the skin from which they arise. To the tribes of the polar circle clothing of such material is inestimable.

The flesh, when in high condition, has several inches of fat on the haunches, and is equal to the best fallow-deer venison. The tongue is highly esteemed. A preparation called Pemmican is made by pouring one-third of melted fat over the pounded meat, and incorporating them well together. The Esquimaux and Greenlanders consider the paunch with its contents of lichen a great delicacy; and in Boothia, as Captain James Ross affirms, these contents form the only vegetable food which the natives ever taste.

3. Dama.—Antlers merging into broad digitated palmations.

597, 598, 599.—The Fallow-

This well-known ornament of our parks is the Hydd (Buck), Hyddes (Doe), Elain (Fawn), of the ancient British; Le Daim (Buck), La Daime (Doe), Faon (Fawn), of the French; Daino (Buck), Damma (Doe), Cerbietto, Cerbietta (Fawn), of the Italians; Gama, Corza (Buck), Venadito (Fawn), of the Spanish; Corza (Buck), Veado (Fawn), of the Portuguese; Damhirsh of the Germans; Dof, Dof Hjort, of the Swedes; Daae, Dijr, of the Danes; Dama vulgaris of Gesner; Cervus palmatus of Klein; Cervus platyceros of Ray; and Cervus Dama of Linnæus.

Desmarest, who regards the Fallow-deer as the Platyceros of Pliny, and the Ἔλαφος εὐρυκέρως, of Oppian (as did also Pennant), observes that it is less extensively spread in Europe than the stag: it does not exist in Russia, but it would seem that it inhabits Lithuania, Moldavia, and Greece, the north of Persia and China, and also Abyssinia; it is abundant in England, but of rarer occurrence in France and Germany.

Cuvier, who remarks that the fallow-deer has become common in all the countries of Europe, adds, "but it appears to be originally a native of Barbary." And he subjoins in a note, that "since the publication of his last edition of the 'Ossemens Fossiles,' he has received a wild fallow-deer killed in the woods to the south of Tunis." We have ourselves examined horns of the fallow-deer brought from the same territory. In Spain, according to Pennant, the breed is very large; and he goes on to state that, "in every country excepting our own, these deer are in a state of nature, unconfined by man, but they are, and have been for some time, confined in parks on the Continent, as they are in England." We may observe that in England, at one period, before parks were enclosed and (as is necessary in our day) the herds were restricted within due bounds, the fallow-deer wandered in freedom, like the stag or roe; they tenanted the great forest which in the time of Henry II. stretched northwards from London, and which, as Fitz-Stephens says, was the covert of stags, deer (damarum), boars, and wild bulls. Pennant informs us that in the old Welsh laws a fallow-deer was valued at the price of a cow, or, as some say, a he-goat.

The fallow-deer is too well known to need describing in detail. Its venison is far superior to that of the stag or roe, and its horns and skin are valuable. Except during the pairing season, when the bucks associate with the does, and during the winter, when the troops mingle promiscuously together, the males and females form separate herds.

The female goes eight months with young, and produces one, sometimes two, at a birth, concealing them among the tall fern or dense underwood of the park; they afterwards associate with the herds of does.

The buck acquires a different name, in the language of "venerie," every year to the sixth. The first year he is a *fawn*—the second, when the simple horns appear, a *pricket*—the third, a *sorrel*—the fourth, a *soare*—the fifth a *buck of the first head*—the sixth, a *buck complete*. In Shakspere's play of 'Love's Labour's Lost,' the "extemporal epitaph on the death of the deer," in which Holofernes "something affects the letter," and in which three of the above terms are employed, is familiar to all. During the pairing season, which takes place at the end of summer or in autumn, the males utter a deep tremulous cry, and engage with each other in obstinate battles, which are continued day after day, till the mastery is completely established. We do not however believe that at this season they are dangerous to persons approaching them; the stag has been known to make a furious attack, but we never heard of similar instances with respect to the fallow-deer.

The fallow-deer may be easily rendered tame and familiar, as we ourselves have often seen. It is said, when thus tamed and brought up in the stable-yard, to delight in the company of the horse; and in proof thereof, it may be observed, that at Newmarket (1828) there was a deer which was accustomed regularly to exercise with the racehorses, and the creature delighted to gallop round the course with them in their morning training. Fig. 598 represents the morning gallop of the associated deer and horses.

The fossil elk of Ireland (Cervus megaceros; C. giganteus, Goldf.). To the Platycerine or Dama group appears to belong that noble species commonly called the fossil elk of Ireland, from its abundance in that country, where its remains occur in bogs and marl-pits, and that so abundantly, that they have ceased to be regarded as objects of curiosity. The huge antlers, indeed, have been used as gates, as stop-gaps in the fields, and for similar purposes. Though most frequent in Ireland, the bones of this species are also found in similar deposits in the Isle of Man, as well as in England; and have been dug up in France, Germany, and Italy, where, according to Cuvier they occur in the same strata with bones of elephants. Ireland was perhaps the last stronghold of the species, which appears to have once thronged that island. It is very seldom, however, that an entire skeleton has been discovered, the remains consisting for the most part of skulls, with the horns attached, and various separate bones disposed without any order. They generally occur in a deposit of shell-marl, covered by a layer of peat, and resting on clay. In this situation, one of the few entire skeletons discovered is stated to have occurred. "Most of the bones," says Archdeacon Maunsell, "and heads, eight in number, were found in the marl; many of them, however, appeared to rest on the clay, and to be merely covered with the marl." It is worthy of remark, that the fossil remains of no other animals are mingled with them. Of the skeleton to which we have alluded, and which graces the museum of the Royal Dublin Society, Mr. Hart drew up a Memoir. "This magnificent skeleton," he observes, "is perfect in every single bone of the framework which contributes to form a part of its general outline; the spine, the chest, the pelvis, and the extremities are all complete in this respect; and when surmounted by the head and beautifully expanded antlers, which extend out to a distance of nearly six feet on either side, forms a splendid display of the reliques of the former grandeur of the animal kingdom, and carries back the imagination to a period when whole herds of this noble wandered at large over the face of the country." The following are a few points of its admeasurement:—

	ft.	in.
Length of the head	1	8¾
Breadth between the orbits	0	10½
Distance between the tips of the horns, measured by the skull	11	10
Ditto, in a straight line across	9	2
Length of each horn	5	9
Greatest breadth of palm	2	9
Circumference of the beam at the root of the brow-antler	1	0¾
Length of spine	10	10
Height to the top of the back	6	6
Ditto, to the highest point of the tip of the horn	10	4

None of the deer tribe of the present day, excepting the Scandinavian Elk, can at all be compared for magnitude to this fossil species; and, until Cuvier pointed out the differences, the antlers were generally regarded as identical with those of that animal or of the moose of North America. Independently of size, however, they differ in many essential points: for example, in the moose-deer the horn has two palms, a lesser one growing forward from the front of the beam where the principal palm begins to expand: the palm of the moose-deer's horn is directed backwards, and is broadest next the beam. (Fig. 607.) In the fossil-animal the palm increases in breadth as it proceeds, which it does in a lateral direction; nor are there fewer differential characters in the skull and general skeleton.

Of the habits of the Cervus megaceros we can only form a conjecture. The size and lateral direction of its spreading antlers must have prevented its inhabiting the dense forest—it must have dwelt on the heath-clad hills: there, armed with the most powerful weapons of self-defence, it ranged secure from the assault of any single aggressor, capable of dashing down the wolf or hyæna with a blow. Did man exist coeval with this animal in its native land? Most probably—yes. A head of the fossil elk, together with several urns and stone hatchets, was discovered in Germany in the same drain. "In the 'Archæologia Britanica' is a letter of the Countess of Moira, giving an account of a human body in gravel under eleven feet of peat, soaked in the bog-water: it was in good preservation, and completely clothed in antique garments of hair," conjectured to be that of the fossil elk. But what is still more conclusive, there exists a rib in the Royal Dublin Society, evidently bearing token of having been wounded by some sharp instrument, which remained long fixed in the wound, but had not penetrated so deep as to destroy the creature's life: it was such a wound as the head of an arrow would produce.

Of the causes which involved the fossil elk in destruction—whether one general catastrophe universally affected the whole race wherever existing—whether local causes, operating at different epochs, have successively extinguished the species, which might have lingered the longest in Ireland—or whether its extermination has been effected by the hand of man, whose agency upon the animal creation is everywhere apparent, no decided opinion can yet be given. We know it existed, and that is all: its history and its fate are buried beneath the shadow of years gone by.

Fig. 600 represents a perfect skeleton of this extinct species; Fig. 601, a figure of the skull and horns—the brow-antler on the right horn is undeveloped; Fig. 602, a direct front view of the skull; Fig. 603, a palatal view of the skull; Fig. 604, profile of the skull; Fig. 605, a horn somewhat differently shaped to the others; Fig. 606, horns of the moose, given by way of comparison.

4. Elaphus, or Stag group.—The common stag of Europe, with its allied species the Barbary stag and the Persian stag, the Wapiti of America, and among others the Cervus Elaphoïdes, Hodgson, and Cervus Wallichii, Cuvier, both natives of Nepâl, may be adduced as examples of this section. The characters consist in the form of the horns, which have three antlers produced from the beam, viz., the brow-antler, the bez-antler, and the antler-royal, besides the snags, or crown (*surroyal*), in which the beam terminates; in the nakedness of the muzzle, and in the possession of large suborbital sinuses. The males have canine teeth, and in old animals the brow-antler is often double. A fine specimen of the horns of the wapiti in the museum of the Zool. Soc. exhibits this luxuriance of growth. (Fig. 607.)

609, 609*a*, 610.—The Common Stag, or Red Deer (*Cervus Elaphus*). Carw (Stag), Ewig (Hind), Elain (Young or Calf), of the ancient British; Le Cerf (Stag), La Biche (Hind), Faon (Young or Calf), of the French; Cervio, Cervia, of the Italians; Ciervo, Cierva, of the Spanish; Cervo, Cerva, of the Portuguese; Hirtz, Hirsch, (Stag), Hind (Hind), Hinde Kalb (Calf), of the Germans; Hart (Stag), and Hinde, of the Dutch; Hjort, Kronhjort (Stag), and Hind, of the Swedes; Kronhjort, Hind, Kid or Hind Kalv, of the Danes.

The red-deer is a native of our island and of the temperate portions of Europe, and considerably exceeds the fallow-deer in size, standing about four feet in height at the shoulders. The hind or female is smaller; the young is spotted with white on the back and sides. During the pairing season, which commences in August, the stags fight desperately with each other, and are even dangerous to persons venturing near their haunts. Formerly the stag was very abundant in the wild hills and in the extensive forests of our island, but the disforesting of vast woodland tracts and the extension of agriculture have limited the range of this noble animal to the larger parks and chaces of our country, to the Cheviot Hills, and to the heath-covered mountains of Scotland. Few or none are to be seen in the New Forest, nor in Woolmer Forest, in Hampshire, where they were once numerous; nor do any now remain in Epping Forest. In the central part of the Grampians there are large herds of red-deer: they frequent the southern part of the bleak and, generally speaking, naked ridge of Minigny, which lies between the Glen of Athol on the south and Badenoch on the north; and between the lofty summits of Ben-y-glac on the east, and the pass of Dalnavardoch on the west. The greater part of this ridge is the property of the Duke of Athol, although many deer are found on the lands of the Duke of Gordon, and others towards the east.

The deer are seldom on the summits; but generally in the glens of the Tilt and Bruar. These deer are often seen in herds of upwards of a thousand; and when, in a track where there is no human abode for twenty or thirty miles, a long line of bucks appear on a height with their branching horns relieved upon a clear mountain sky, the sight is very imposing.

The forest of Athol, consisting of a hundred thousand acres, is devoted to red-deer; they exist in Mar Forest and Glenartney, and in the west districts of Ross and Sutherland. The chace of the red-deer has ever been, from its excitement, a favourite diversion—and formerly was conducted in a style of great magnificence, vast herds being driven "with hound and horn" to where the hunters were stationed with guns (formerly bows and arrows), and who dealt havoc among their numbers. The deer moved forwards in close array, guided by a leader, and often in despair broke through the circle of their foes, and made their escape. We may imagine the danger resulting from the rush of perhaps a thousand deer determined to break through the line of their assailants.

The spirited description of a similar scene in Sir W. Scott's novel of 'Waverley' is familiar to all. This mode of driving the deer is now never practised, at least on the great scale. The present plan, that of deer-stalking, is to proceed cautiously within due distance of the herd, and, being concealed, to bring them down with the rifle: when wounded and brought to bay, the stag often rushes on his assailant, whose life is in imminent danger. The red-deer is too well known to require a detailed description. He swims vigorously, and will cross lakes, and pass from islet to islet at considerable distances apart.

611.—The Wapiti.

(*Cervus Wapiti*, Mitchell). C. strongyloceros, Schreber; C. Canadensis, Briss.; American Elk, Bewick; Waskeesews of Hutchins; Wawaskeesho, Awaskees, and Moostosh of the Cree Indians. The Wapiti has been confounded with the Elk, this name being given to it in Lewis and Clark's Voyages. It is the Red-deer of the Hudson's Bay traders.

This American representative of our European stag differs from the latter, in being much larger and more powerful, and also of a darker colour; his form is more heavy, and the limbs more robust; the neck is of vast thickness and strength.

The wapiti does not extend its range higher north than the fifty-seventh parallel of latitude, nor is it found to the eastward of a line drawn from the north end of Lake Winepeg in long 103°, and from thence till it strikes the Elk River in the hundred and eleventh degree. It is common among the clumps of wood that skirt the plains of the Saskatchewan, where it lives in small herds of six or seven individuals. They feed, says Dr. Richardson, on grass, on the young shoots of willows and poplars, and are very fond of the hips of the Rosa blanda, which forms much of the underwood of the districts which they frequent. Their voice is a shrill whistling, quivering noise, nothing resembling the "bell" of our stag. Hearne considers the wapiti as more stupid than any other species of the deer tribe.

The horns of this species (Fig. 607) attain to a vast size and weight (53 or 54 lbs. the pair), and are most formidable weapons: nor is the male thus armed to be approached without caution; his temper being vicious and irascible, and his strength prodigious. A few years since, one of the male wapitis in the gardens of the Zoological Society, London, in a fit of rage drove his brow-antlers into the body of a female of the same species, lifted her up, and threw her down dead.

The male wapiti stand upwards of four feet and a half at the shoulders. The general colour is yellowish brown, a black mark extending from the angle of the mouth along the lower jaw; the tail is short and encircled (as in the red-deer and others of this section) by a pale yellowish haunch-mark.

5. Rusa.—This group consists of deer peculiar to India, several species being large and formidable. The horns are rugged and cylindrical, with a large sharp brow-antler, but no bez-antler, the beam bifurcating at the top into a sharp anterior and posterior snag: the muzzle is broad and naked, the suborbital sinuses are deep and large, and the males possess canine teeth; a mane of long coarse hairs runs down the neck. Of six or seven species belonging to this section, we may notice the Sambur.

612.—The Sambur

(*Cervus Hippelaphus*). Several specimens of this deer are in the gardens of the Zoological Society, London; and the males when armed with their antlers are noted for their vicious temper. In size the male sambur exceeds our common stag, but is inferior to the huge and heavy wapiti: and if less powerful, is more active and alert. The hair is close, harsh, and of a dusky or greyish brown; a band of black surrounds the muzzle, but the edges of the upper lip and the tip of the under are white; the hairs of the throat are long and bristly, forming a full fringe; a mane of similar hair runs along the back of the neck: the crupper-mark round the tail is very circumscribed, and yellowish. The sambur is found in the Ghauts of Dukhun, in Kandesh, and the lower hills of Nepâl. It occurs also in other districts of India. In common with the rest of the Rusa tribe it is fond of the water, and resides in wooded situations.

Another species of this section is the Cervus Aristotelis, Cuvier, a native of Bengal and the low hills of Nepal. It is termed elk by the British sportsman, and is said to be extremely powerful and vicious. Mr. Hodgson notices a black deer in the Nepâl hills belonging to the Rusa tribe, but undescribed. ('Zool. Proceeds.' 1831, p. 99.)

Of the other species to be referred to this group, and described by various authors, we may mention the Cervus equinus, Cuvier, found in Sumatra and the lower hills of Nepâl; the C. unicolor, Smith, a native of the dense forests of Ceylon; the C. Peronii, Cuvier, and the C. Mariannus, Quoy and Gaimard—the former a native of Timor, the latter of the Marianne Islands, or Ladrones.

Mr. Hodgson observes that a new species of deer, to which he has given the name of C. Bahraunja, serves, with C. Wallichii, to connect the Elaphine and Rusan groups. Fig. 613 represents the skull of the sambur-deer.

6. Axis.—The characters of this section differ but little from those of Rusa; the horns have a brow-antler, and bifurcate at the top; the suborbital sinuses are moderate, and the males are destitute of canines. It is, however, in size, contour, and disposition that the greatest contrast exists between the Axine and Rusan groups. In the Axine group the limbs are delicate, the general form is more graceful than robust, and none in size much exceed our fallow-deer, to which the common axis especially (excepting as respects the antlers) bears a near resemblance; the females, indeed, of both species being, on a superficial view, scarcely distinguishable. The hair is short, smooth, and close; the expression of the physiognomy is gentle, yet animated, and agrees with the disposition. In captivity these deer are quiet and inoffensive.

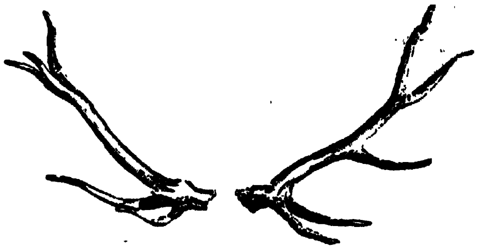
614.—The Axis Deer

(*Cervus Axis*, Erxl.). The spotted axis is, perhaps, the best known of all the Indian deer; it thrives well not only in our menageries, but even in parks, and breeds in our climate. It is very abundant on the banks of the Ganges and in Bengal, as well as in the larger islands of the Indian Archipelago, where it lives in herds, the luxuriant vegetation of the jungles (its favourite localities) affording abundance of food. The general colour of this species is fawn-yellow, a black stripe running down the spine of the back; the sides are beautifully and regularly spotted with white: a row forming an almost continuous line passes along each side of the belly.

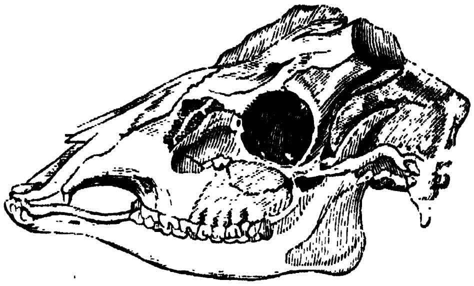
The hog-deer (C. Porcinus) is another species belonging to this section: it is lower on the limbs and stouter in the body than the spotted axis: its colour is yellowish grey, spotted slightly on the back and flanks.

A new species from the Ganges is described by Mr. Ogilby in the 'Zool. Proceeds.' 1831, p. 136, under the title of C. Nudipalpebra. A specimen exists in the museum of the Zoological Society.

615.—Roebuck

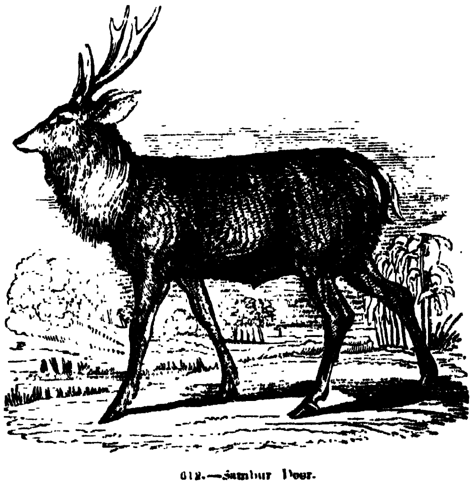


607.—Horns of Wapiti.



3.—Skull of Sambur Deer

609.—The Red Deer, or Stag, and the Roebuck.

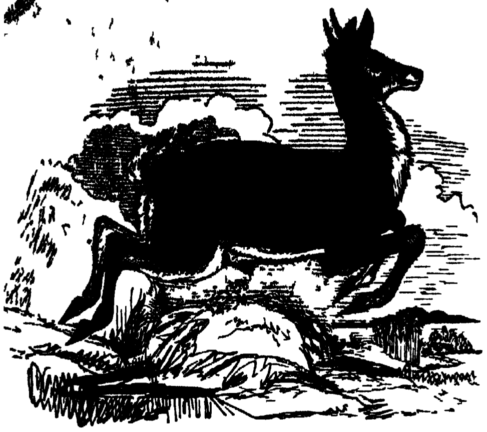


612.—Sambur Deer.

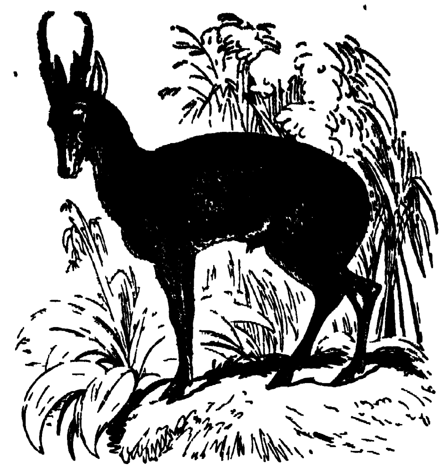
611.—Wapiti

610.—Red Deer.

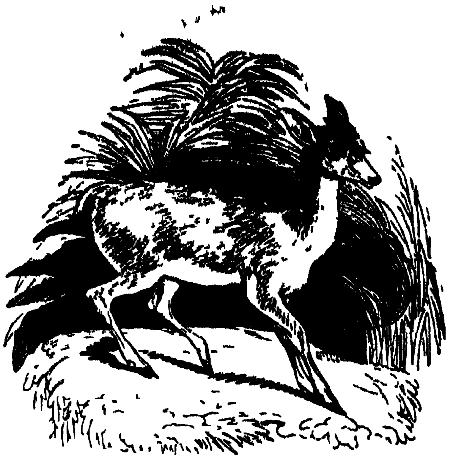
4.—Axis



616.—Guazu-pita



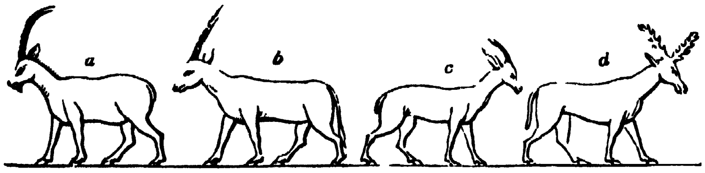
619.—Muntjak



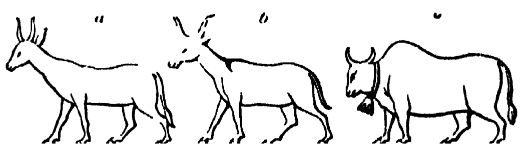
617.—Guazu bira.

626.—Group of Ariel Ga

[illegible] Ariel Gazelle



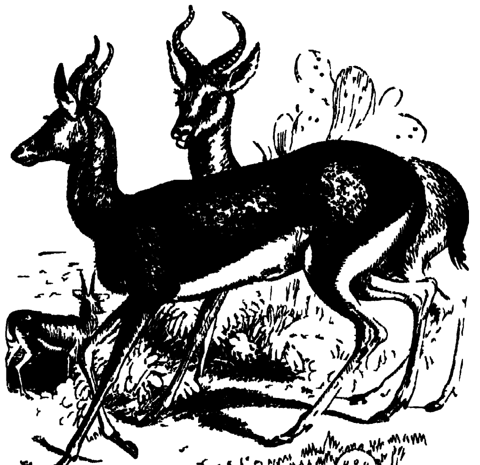
631.—Animals from Egyptian Sculptures.



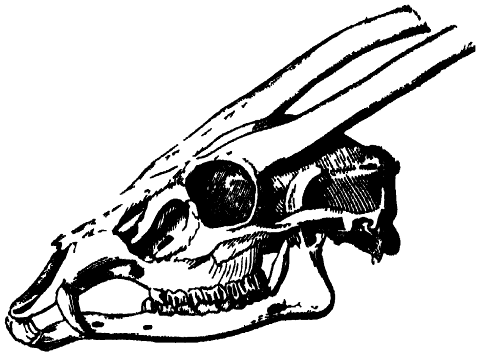
632.—Animals from Egyptian Sculpture

62[illegible] ame Gazelle

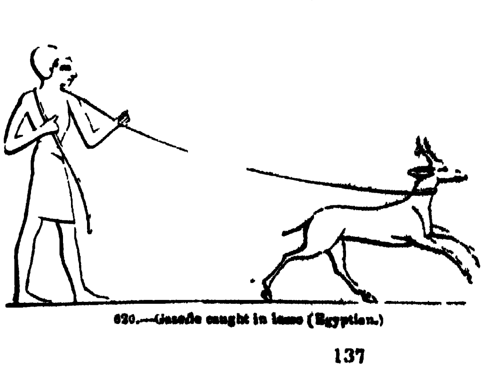
[illegible]



621.—Ariel Gazelle.



618.—Skull of Muntjak



620.—Gazelle caught in lasso (Egyptian.)

7. **Capreolus.—The Roes.**—The roes or roebucks are distinguished by the following characters:—The horns are small, cylindrical, and rugged; and when fully developed are divided above into three snags, of which the largest is seated anteriorly. The muzzle is naked, and there are neither canines nor suborbital sinuses. The tail is extremely short, the body compact, the limbs slender but vigorous.

609 *b*. 615.—The Common Roebuck

(*Cervus Capreolus*). This species is the Caprea, Capreolus Dorcas, of Gesner; Capreolus, of Ray and of Sibbald; Cervus Capreolus, of Linnæus; Cervus minimus, of Klein; Iwrch (male), Iyrcheli (female), of the antient British; Le Chevreuil, of the French; Capriolo, of the Italians; Zorlito, Cabronzillo montes, of the Spanish; Cabra montes, of the Portuguese; Rehbock (male), Rehgees, of the Germans; Radiur, Rabock, of the Swedes; Raaedijr, Raaebuk, of the Danes.

The roebuck was formerly common throughout the whole of our island, but is now almost exclusively confined to the wooded hills of Scotland north of the Forth. South of that river it is very rare, one or two wild parks only possessing a few; but in the rugged woods of Westmoreland and Cumberland it is tolerably abundant. It is widely spread throughout the temperate latitudes of continental Europe, wherever extensive forests and wild uncultivated districts covered with brushwood afford it an asylum.

The roebuck is the least, and one of the most active and beautiful, of our European deer; wild, shy, and cautious, it does not herd in troops, but lives singly, or in small companies consisting of the male, female, and young; the latter being generally two, sometimes three, in number. These remain for eight or nine months with their parents, which continue attached for life. The roe is more cunning than the stag, and when hunted will endeavour, by various subtle artifices, to elude its pursuers. It will wind and double on its track, then take bounds of surprising extent, and lie close amongst the herbage of its covert till the dogs, having lost the scent, pass off to a distance. The flesh of this animal is not in high estimation.

The roe stands about two feet three inches in height at the shoulder. In the winter the hair on the body is long, the lower part of each hair is ash-coloured; there is a narrow bar of black near the end, and the tip is yellow. On the face the hair is black, tipped with yellow. The ears are long, of a pale yellow on the inside, and covered with long hair. In summer the coat is short and smooth, and of a bright reddish colour. The chest, belly, legs, and inside of the thighs, are yellowish white; the rump is pure white; and the tail very short. On the outside of the hind-leg, below the joint, is a tuft of long hair.

A specimen of the roe of Tartary (C. Pygargus, Pallas), the tailless roe of Pennant, once fell under our notice. In size it equals the fallow-deer; it inhabits the mountain districts of Hyrcania and other parts of Northern Siberia, and also the snowy range of Central Asia.

8. **Mazama**, or American fallow.—The elegant deer composing this section are all confined to the American continent. The horns are rough, with a cylindrical stem, and slightly compressed branches, which have a tendency to form arches or segments of a circle. Of these an anterior branch projects somewhat forwards; the stem sweeps outwards, curving inwards and forwards at its extremity, which divides into two or three branches. There are no canines. The suborbital sinuses are small, and appear like a fold of the skin. The ears are long and open; the tail is long, and inclining to be bushy; the muzzle is naked. The species belonging to this section are numerous. The Virginian deer is the best known. This beautiful species is spread very extensively, ranging from Canada to Cayenne: it tenants the woods in small herds, and its chace is everywhere followed with ardour, so that in a few years the rifle will exterminate it in many districts where it is still common. The three modes of "Still-hunting," "Fire light-hunting," and "Driving" are amusingly described by Audubon in the first vol. of his 'Ornithological Biography.'

In the museum of the Zool. Soc. Lond. there is a fine specimen of the black-tailed deer (Cervus macrotis, Say), which inhabits the plains of the Missouri, Saskatchewan, and Columbia; it is numerous in the Quamash Flats which border the Kooskookee river. It is remarkable for the size of its ears, and the length and fulness of the tail, which is white with a tinge of brown, and largely tipped with black. The general colour is brownish grey. It exceeds the Virginian deer, its height at the shoulders being two feet six inches.

The Cervus leucurus is another allied species, which, from its size, form, and habits, has obtained the name of Roebuck from the Scottish Highlanders employed by the Hudson's Bay Company, and that of Chevreuil from the French Canadians. It is common in the districts adjoining the river Columbia, and especially the fertile prairies of the Cowalidske and Multnomah rivers. The young are spotted until the middle of the first winter, when they assume the uniform colour of the adults.

Azara describes two species belonging to this section, under the terms Gouazoupoucou (Cervus paludosus, Desm.) and Gouazouti (C. campestris, F. Cuv.), both natives of Paraguay.

The Gouazouti (or Guazuti, Cervus campestris) inhabits the open Pampas, where it is more than a match for a horse in speed. It stands about two feet six inches in height at the shoulder. The hair is rough, close, and of a reddish bay, the space round the eyes, and the under parts of the head and body being white; the hairs of the back are of a leaden grey colour at the base, the tips only being red. The fawns are spotted with white. A most powerful and disgusting odour of garlic proceeds from the males, especially when their horns are in perfection: this odour is not lost in the preserved skin, as we can personally testify. "Frequently," says Mr. Darwin, "when passing at the distance of half a mile to the leeward of a herd, I have perceived the whole air tainted with the effluvium." "This deer," says the same talented author, "is exceedingly abundant throughout the countries bordering on the Plata. It is found in northern Patagonia as far south as the Rio Negro (lat. 41°), but farther southward none were seen by the officers employed in surveying the coast. It appears to prefer a hilly country. I saw many small herds, containing from five to seven animals each, near the Sierra Ventana, and among the hills north of Maldonado. If a person crawling close along the ground advances towards a herd, the deer, frequently out of curiosity, approach to reconnoitre him. I have by this means killed from one spot three out of the same herd. Though so tame and inquisitive, yet when approached on horseback they are exceedingly wary. In this country nobody goes on foot, and the deer knows man as its enemy only when he is mounted and armed with the bolas. At Bahia Blanca, a recent establishment in northern Patagonia, I was surprised to find how little the deer cared for the noise of a gun: one day I fired ten times from within eighty yards at one animal, and it was much more startled at the ball cutting up the ground than at the report of my rifle. My powder being exhausted, I was obliged (to my shame as a sportsman be it spoken) to get up and halloo till the deer ran away."

9. **Subulo.**—The Guazus, or Brockets, as they are termed, are distinguished by the simplicity of their horns, which consist of a single slender stem without snags; the suborbital sinuses are small; the nose is pointed, and the naked muzzle small, extending at the side of the nostrils into a glandular spot. The species of this section are small, and delicately formed; they inhabit the swampy woods of South America, in small families consisting of eight or ten females, in company with a single male; from which circumstance arose the mistaken idea that this part of the globe possessed deer entirely destitute of horns, while their simple form in the few males seen (for the females are far more numerous) led to the supposition that these were young animals with their first or brocket horns. Hence the term Brocket, adopted as the descriptive appellation of the group. In the museum of the Zool. Society is a specimen of the female of a deer which most probably belongs to the present section. It is described in the 'Proceeds.' for 1831, p. 27, as the Cervus humilis, Benn.:—it is about a foot and a half in height at the shoulders, and of a rufous colour, the fore-parts having a blackish tinge. The body is stout; the limbs short; the face broad. Mr. Bennett, by whom this species was characterized, "was informed by Captain P. P. King, R.N., that a second skin of the same species had been brought to England by him; that the young was spotted with yellow, and had a yellow stripe on each side of the back; and that the animal was plentiful at Concepcion, and found even as far south as the archipelago of Chiloe, living, he believed, in small herds." Until the horns of the male be known, this species stands only provisionally where we have placed it.

The other known species of this section are the Guazu-pita (Cervus Rufus, F. Cuv.), the Guazubira (Cervus nemorivagus, F. Cuv.), and the Apara Brocket (Cervus simplicicornis, H. Smith).

616.—The Guaza-pita

(*Cervus rufus*). The Guazu-pita is somewhat larger than a roebuck: its general colour is rufous with a dusky tint on the face and legs; the lips and chin being white. Azara states that the proportion of males to females in this species is one to ten; and that the fawns are spotted with white. It frequents dense forests, in which it remains concealed during the day, but at night, or during the dusk of the evening it ventures into the open lands bordering the woods, and often invades the cultivated fields or gardens of the natives, for the sake of obtaining French-beans, which are a favourite food. Although not destitute of activity, it is soon exhausted, and easily taken either by dogs, or by means of the lasso.

617.—The Guazu-bira

(*Cervus nemorivagus*) is smaller and more delicately formed than the preceding species, which, however, it resembles in general habits and manners, inhabiting also the low moist woods of South America. The colour of this little deer is dusky grey, passing into white on the under parts.

The Cervus simplicicornis is a native of Brazil: its colour is rich fulvous, with a dusky ring round the orbits and a spot of the same tint at the angle of the mouth.

10. **Stylocerus**, or the Muntjaks.—The species of this section are natives of India and the Indian Islands, and there is something so peculiar in their physiognomy and appearance, that a glance serves to discriminate between them and all others of the deer tribe. Setting aside the horns, with which the males only are furnished, they remind one strongly of the musk-deer, or Chevrotains, though of larger stature. The body, as in the musk-deer, is rounded; the head triangular, and tapering to a fine muzzle; their limbs slender and delicately turned, and their tongue long and flexible. The males, moreover, have long canines in the upper jaw, which protrude beyond the lips. In manners they are timid and gentle, but are easily domesticated, and soon become familiar.

One remarkable character in the Muntjaks consists in the form of the horns, and the manner in which they rise from the forehead, supported on long slender peduncles covered with skin, and turned obliquely outwards, with a tuft of hair along their anterior aspect, becoming very full round the burr of the horn; the hair on the back part and sides of these peduncles is close. These supports for the small horns do not rise abruptly, but are continued from two prominent ridges beginning below the angle of each eye, running obliquely upwards, diverging as they proceed, and constituting an abrupt outline to the flat triangular forehead. (See Fig. 618, the Skull of the Muntjak.) These ridges are covered with the skin of the forehead, which for the space of nearly an inch on the inner side of each ridge, parallel to the eyes, forms a narrow naked fold, or kind of sinus, capable of being opened or closed at pleasure, and evidently of a glandular nature. When closed these sinuses are hidden by the hair. The horns scarcely, if at all, exceed the peduncles in length; they are pointed, converge at their points, and have a small rudimentary snag at their base anteriorly. The suborbital sinuses are large and deep, the muzzle is small and naked, the eyes are large and animated, the ears large and open. The first horns obtained are simple, and it is said that there is only one renewal, the second pair being permanent (a doubtful circumstance). As the females want horns, the peduncles and their continuation as ridges down the forehead are absent, but a tuft of hair indicates their situation.

The species composing the present section are but imperfectly known. Colonel H. Smith enumerates five, of which two at least are doubtful. The most familiar example of the group is the Muntjak of Java and Sumatra, the Kidang of Horsfield.

619.—The Kidang, or Common Muntjak

(*Cervus Muntjak*). This most elegant and beautiful animal equals a roebuck in size. According to Dr. Horsfield, its favourite haunts in Java are hills covered with brushwood, and elevated grounds adjacent to wild forests, or shrubby districts between the latter and the cultivated grounds. Its voice is so like the barking of a dog as to deceive the ears of persons not familiar to the sound. The food of this species consists principally of the Saccharum spicatum, the Phyllanthus emblica, and other malvaceous plants abundant in the hilly districts. The Muntjak is eagerly hunted, both for the sake of its flesh, which is excellent, and for the sport which the chase affords. Its flight is very rapid, but it generally makes a circle, returning to the spot whence it started. When brought to bay, the male defends itself against the dogs with great courage, using its horns and long sharp tusks with severe effect. It is often taken in snares, and sometimes by riding it down on horseback, and striking it with a sword. This mode is highly dangerous, but is followed nevertheless with the utmost enthusiasm, by daring hunters, mounted on the naked back of horses trained to the chase which is conducted with frantic impetuosity.

The general colour of this species is bright reddish brown, the under parts being white.

Colonel Sykes observed a species of Muntjak in the Ghauts of Dukhun, which he states to be never seen on the plains. It is termed Baiker by the Mahrattas. Mr. Hodgson notices a species called Katwa, proper to the central region of Nepâl, but occasionally occurring in the lower valleys of Kachar. A species from China is described by Mr. Ogilby under the title of Cervus Reevesii.

HOLLOW-HORNED RUMINANTS.

1. **Antelopes.**—The word antelope (antilope), now so generally used, is of very uncertain origin. It appears first to have been adopted as the designation of a species, but was subsequently given by Pallas as the title of a genus. The first occurrence of the word Ανθολοψ is in the 'Hexameron' of Eustathius (fourth century), as the name of an apparently fabulous animal. Bochart supposes it to be derived from the Coptic Panthalops, which signifies the Unicorn; but it may be derived from the Greek Ανθος, a flower, and Ωψ, the eye, or *οπτομαι*, to see, in allusion to the brightness and beauty of the full beaming eyes which are so remarkable in most of these animals, and which have often rendered the gazelle the theme of the Persian and Arabian poets. The name of the gazelle, *dorcas*, from δερκω, or δερκομαι, to see, was a common name for women among the Greeks and Romans.

It is interesting to trace the acquaintance which the ancients had with objects of natural history, as demonstrated by their drawings or sculptured representations: nor is the examination of them unimportant; they often supply us with a hint as to the ancient geographical distribution of animals, or as to facts connected with their history, and prove that many hundred years past the species existed with the same forms and characters as at the present time. It is therefore not out of place to draw our readers' attention to some figures in outline from the Egyptian sculptures. Fig. 620 represents a gazelle caught by the noose or lasso, an instrument used by the ancient Egyptians, and by the modern Gauchos of South America. Fig. 621: *a*, Ibex; *b*, Antelope leucoryx; *c*, Gazelle; *d*, a species of Stag. Fig. 622: *a*, Antelope; *b*, Goat; *c*, Aoudad or Kebsch (Ovis Tragelaphus, Desm.), found in the mountains along the Nile, and on the northern coast of Africa.

The section or family to which the title of Antelope (Antilope) is ordinarily given, embraces, it must be confessed, a somewhat ill-assorted assemblage, requiring to be distributed into several distinct genera. The fact is, that every hollow-horned ruminant, which is neither one of the sheep, goats, nor oxen, has been assigned to the antelopes, and hence the diversities of form and habits which we see among the members of this extensive group. Mr. Ogilby ('Zool. Proceeds,' 1836, p. 132) makes the remark, that "the genus Antelope has become a kind of zoological refuge for the destitute, and forms an incongruous assemblage of all the hollow-horned ruminants which the mere shape of the horns excluded from the genera Bos, Ovis, and Capra; thus it has come to contain nearly four times as many species as all the rest of the hollow-horned ruminants together. So diversified are its forms, and so incongruous its materials, that it presents not a single character which will either apply to all its species, or suffice to differentiate it from conterminous genera."

In analyzing and re-arranging the antelopes, Mr. Ogilby draws his characters from the horns, the form of the upper lip, whether modified for grazing or browsing, the existence of lachrymal sinuses, inguinal sacs, and interdigital pores, and the number of the teats in the female. With respect to interdigital pores, he observes that their existence or non-existence is an important point, as their use appears to be to lubricate the hoofs by a fluid secretion: hence are they connected with the geographical distribution of the species, confining them to the rich savannah or the moist forest, or enabling them to roam over the arid mountain, the parched karroo, and the burning desert. Among the antelopes, then, there are, on the one hand, species allied to the goats and sheep; on the other, to the oxen; and as widely differing in form and appearance from the gazelle or the Indian antelope as does the wild bull or the ibex.

But we must not forget, nor do we forget, that our object is not to enter into the minutiæ of scientific disquisitions, fit only for the pages of works devoted to the more abstruse departments of Zoology. Were we to follow our feelings, we should expatiate on this part of the subject more perhaps to our own gratification than that of our reader: we shall therefore forbear; and, allowing the family termed Antelope to remain as it does, we shall merely divide it for the sake of perspicuity into four subdivisions, namely:—True Antelopes, Bush Antelopes, Capriform Antelopes, and Boviform Antelopes.

The antelopes differ essentially from the deer in the structure of the horns. In the deer the horns, or more properly antlers, are deciduous; but in the antelopes, and the same observation applies to the goat and ox, these organs consist of a horny sheath, investing a conical support of bone; their increase is gradual, and they are not yearly shed and renewed. The bony central support, or core, is a process from the frontal bone: in most antelopes it is solid, or nearly so; it commences small at first, and assumes various directions in the various species. One antelope has four horns. The horny sheath consists of fibres analogous to those of whalebone, or rather hair, running longitudinally or spirally, and agglutinated into one uniform mass. If this sheath be stripped from its bony core, the latter will be found covered by a highly vascular periosteum, from which the fibres in question are secreted. They are formed in regular succession as the bone grows, so that the horn which covered the whole process or core in the young animal will in due time be thrown to its summit. The outermost layer was once in contact with the core, but was gradually pushed outwards and upwards. In some groups of antelopes both sexes are furnished with horns, in others only the male: and it is difficult in many cases to discriminate between the hornless females of one of the antelope and of one of the deer tribe. It is chiefly to the warmer latitudes that the antelopes are confined, and Africa may be regarded as their great nursery; many, however, are Asiatic; the Saiga and the Chamois are natives of Europe; the Prongbuck and a closely-allied species (if they can be called antelopes) are natives of America.

True Antelopes.

Gazella, Ogilby. Horns in both sexes, lachrymal sinuses distinct and moveable. Interdigital pits and inguinal pores large. Female with two teats. Horns lyrate.

623, 624, 625, 626, 627, 628.—The Ariel Gazelle

(*Antilope Arabica*). This beautiful species inhabits Arabia and Syria, where it is seen in large herds, bounding over the desert with amazing fleetness. Its eyes are peculiarly large, dark, and lustrous, and have supplied a simile to the Oriental poets and orators; indeed, to say of a woman "she has the eyes of a gazelle," is a most flattering commendation. The Ariel antelope is an object of the chace in Arabia, as it was among the ancient Egyptians, whose delineations of it are abundant. Its flesh is said to be excellent. So swift are these animals, that the greyhound unaided cannot overtake them: the falcon, therefore, is brought into service. The huntsman advances as near as possible to the herd, the dogs are then slipped, and the falcon thrown off. the individual which the dogs have singled is attacked by the falcon, which is trained to strike at the head and eyes, so as to confuse the game, and check its speed, thereby enabling the dogs to come up to it. It is a common practice to shoot the gazelle. Burckhardt informs us that on the eastern frontier of Syria are several places allotted for the hunting of this animal, or rather for its entrapment and destruction. An open space on the plain, about one mile and a half square, is enclosed on three sides by a wall of loose stones, too high for the gazelle to leap over. Gaps are left in different parts of the wall, and at each gap a deep ditch is sunk on the outside. The enclosure is situated near some rivulet or spring to which the gazelles resort in summer. When the sport is to begin, many peasants assemble and watch till they see a herd of gazelles advancing from a distance towards the enclosure, into which they drive them. The gazelles, frightened by the shouts of the people and the discharge of the fire-arms, endeavour to leap over the wall, but can only effect this at the gaps, where they fall into the ditch outside and are easily taken, sometimes by hundreds. The chief of the herd always leaps first, and the others follow him one by one. The gazelles thus captured are immediately killed, and their flesh sold to the Arabs and neighbouring Fellahs. Of the skin a kind of parchment is made, and used to cover the small drum with which the Syrians accompany some musical instruments or the voice. When taken young, wild and timid as the gazelle is, it is readily tamed, and becomes familiar and quite at ease. Tame gazelles are frequently seen at large in the courtyards of houses in Syria, and their beauty, exquisite form, and playfulness render them great favourites. The Ariel gazelle is about one foot nine inches high at the shoulder; its limbs are slender, but vigorous; and all its actions are light and spirited. In full flight it lays the horns back almost on the shoulders, and seems to skim over the level plain, almost without touching it.

The general colour above is dark fawn or yellowish brown; the under parts are white, divided from the colour of the upper parts by a black or deep brown band along the flanks; the nose has a broad mark of dark brown, and on each side of the face a broad stripe of white passes from the horns over the eyes to the nose, while a narrow stripe of black, from the inner angle of the eye to the nose, separates the white streak from the fawn-colour of the cheeks; the knees are furnished with dark brushes of hair.

A closely allied species, the Ahu or Tseyran (A. subgutturosa) is common in Persia and the country round Lake Baikal. Whether it be truly a distinct species or only a mere variety of the Ariel gazelle remains to be decided. It is hunted in Persia with greyhounds and falcons, which mutually assist each other.

629, 630.—The Dorcas Gazelle

(*A. Dorcas*). This species differs from the Ariel gazelle chiefly in being of a much lighter colour, presenting, however, the same markings and arrangement of tints. It is a native of Northern Africa, and lives in large herds upon the borders of the Tell, or cultivated country, and the Sahara, or desert. When a troop of these gazelles are pursued, they fly to some distance, then stop, turn round and gaze at the hunter, and again take to flight. If hard pressed they disperse in different directions, but soon reunite; and when surrounded and brought to bay, they defend themselves with spirit and obstinacy, uniting in a close circle, with the females and fawns in the centre, and presenting their horns at all points to their enemies. This gazelle is the common prey of the lion and panther.

Another gazelle (perhaps a variety), called the Kevel (A. Kevella, Pallas), resides in vast flocks on the open stony plains of Senegal.

631. The Blessbok

(*Antilope Pygarga*). Southern Africa is the native country of this fine antelope, which is also called Bontebok, or Painted Goat, by the Dutch colonists. It is superior in size to the stag of Europe, exceeding, when adult, three and a half feet in height at the shoulder. The horns are sixteen inches long, large, and regularly lyrated.

The blessbok was once very common within the districts of the Cape Colony, where in some parts it still exists, but not in such multitudes as formerly, when it was said to cover the plains in troops of thousands. In the country beyond the colonial borders it is tolerably abundant. The blessbok is fleet and active; and its markings are very ornamental. The colours of the head and body are most singularly disposed, the whole animal appears as if it had been artificially painted with different shades, laid on in separate masses. The head and neck are of a brilliant brownish bay, so deep as to resemble the colour of arterial blood: this is particularly visible upon the cheeks and about the root of the horns, from the central point between which descends a narrow stripe of the purest white as far as the orbits, immediately above which it expands and covers the whole face and nose down to the muzzle, forming a broad mark, or, as it is called in horses, a blaze, and giving origin to the name of blessbok, or blazebuck, by which this species is known among the Cape colonists. The back is of a brownish bay, thickly overlaid, or, as it were, glazed or japanned with dull purplish white, and there is a very broad purplish brown band on the flanks passing from the fore-arm backwards, and extending obliquely over the outer face of the thighs. The breast, belly, and interior of the fore-arms and thighs are white, and this colour also shows itself on the posterior face of the hips and thighs, and passes in a small crescent over the rear of the croup forming a white disc around the tail, and giving origin to the specific name of Pygarga, which has been rather arbitrarily bestowed upon this animal, the real pygarga of the ancients being certainly a different species, and an inhabitant of Northern Africa. The tail is long and switched, nearly naked at the root, and terminated by a tuft of very long black hair. The knees are without brushes. The young are at first of a brownish red colour on the body, partially glazed, as in the adults; but what is most remarkable of all is, that the face, instead of being white as in the grown animal, is of a very deep brownish black colour, slightly mixed with scattered grey hairs.

It was from a young animal that our engraving (Fig. 631) was taken.

632.—Sœmmering's Antelope

(*Antilope Sœmmeringii*). This light and graceful antelope, which exceeds the Ariel gazelle in size, is a native of Abyssinia, where it was discovered by Rüppel during his journey through the northern provinces of that country, and afterwards described by Cretzchmar in the zoological portion of Rüppel's account of his travels.

It frequents hilly districts, but is not gregarious like the common gazelle: it lives in pairs, and is fleet and vigorous. Beyond these points we know nothing of its history. The horns of this elegant antelope are regularly lyrated, bending boldly out-

628.—Ariel Gazelles.

630.—Dorcas Gazelle.

632.—Sœmmering's Antelope

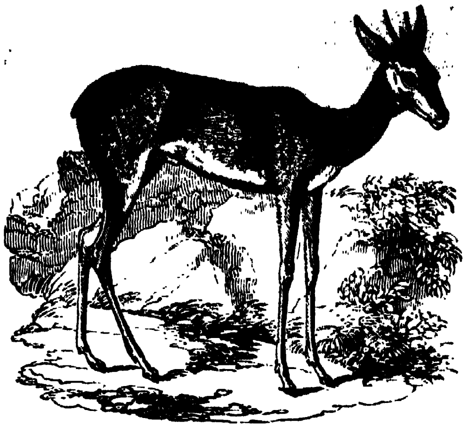
634.—Hunting the Springbuck

633.—M'horr.

629.—[illegible] Dorcas Gazelle.

631. [illegible]

639.—Kleinbok.



637.—Madoqua.

635.—Indian Antelope.

642.—Hunting the Chamois.

640.—Chamois.

638.—Reitbok.

643.—Chamois-hunters.

636.—Pallah.

wards towards the points, and then suddenly turning inwards towards one another, with a very sharp and well defined curve; they are annulated with fifteen or sixteen prominent and complete rings, which reach from the base to the inward curvature within about two inches and a quarter of the points. The general colour is a beautiful clear Isabel or yellowish dun, the hair being extremely short, and appearing almost as if it had been clipped or shorn. It does not lie close and smooth upon the hide, nor does it all follow the same direction, as in the generality of animals, but is disposed in innumerable small waves, pointing in different directions, as if it had been regularly shaded and parted on each side, and appearing glossy or glazed along their ridges with a shining dun shade, more or less intense according to the light in which it is observed. All the under parts of the body are abruptly of the most pure and brilliant white, and a large disc of the same colour surrounds the tail and passes over the rump and croup. The tail is small and slender, nearly naked at the root, and furnished at the extremity with a tuft of mixed brown and grey hairs. The outsides of the legs are very pale fawn colour, the insides white, and the knee-brushes white and fawn mixed. The ears are pretty long, and brown, with a narrow black border surrounding their outer edge. The face is dark brown in some specimens, and pure black in others, curiously mixed with wavy red on the forehead; on each side of this a broad white band passes from the root of the horns over the eyes to the nose, and there is an indication of a small black one from the anterior angle of the eye to the corner of the mouth, separating this white band from the cheeks and sides of the lower jaw, which are uniform fawn colour. The horns of the female have nearly the same curvature as those of the male, and are fully as long, but they are much more slender, and have not such prominent annuli.

633.—The M'horr

(*A. Mhorr*, Bennett). The M'horr is a native of Wednoon, twelve days' journey inland from Mogadore, whence some years since two living specimens were sent to the gardens of the Zool. Soc. Lond. The species is described and figured by Mr. Bennett in the 'Zool. Transactions.' Of its habits we have no account. Its general colour is deep fulvous or reddish brown, becoming paler on the sides of the face and passing into white about the eyes, nose, lips, and lower jaw; an irregular black mark between the eyes and the mouth. A square mark midway on the front of the neck; the under parts, croup, back of the thighs, tail, and inside the limbs are abruptly white; the tail has a fringe of black hairs at its termination; the horns are somewhat lyrate, and strongly annulated, and after bending back, suddenly curve forwards, the points being hooked. Height at the shoulder two feet six inches.

634.—The Springbuck

(*Antilope Euchore*). Among the true antelopes this species is one of the most graceful and beautiful; and its movements are light and rapid. It is a native of the wild karroos of South Africa, where it lives in vast troops, which are irregularly migratory. Its name springbuck (springbok) is given in allusion to its singular habit of leaping perpendicularly when alarmed or as it scours the plain, and that to the height of several feet. Mr. Burchell well describes the effect produced by large herds of these interesting creatures spread over an extensive plain, intermingled with troops of gnus and quaggas. Two thousand springbucks seen at one view must, indeed, have been a noble spectacle. The plain, he says, "afforded no other object to fix the attention, and even if it had presented many, I should not readily have ceased admiring these elegant animals, or have been diverted from watching their manners. It was only occasionally that they took those remarkable leaps which have been the origin of their name; but when grazing or moving at leisure they walked and trotted like other antelopes or the common deer. When pursued or hastening their pace, they frequently took an extraordinary bound, rising, with curved or elevated backs, high into the air, generally to the height of eight feet, and appearing as if about to take flight. Some of the herds moved by us almost within musket-shot, and I observed that in crossing the beaten road the greater number cleared it by one of those flying leaps." The most remarkable point in the history of the springbuck relates to its habits of migration. The karroos, or vast wilds in the interior of Southern Africa, where this animal resides in almost incredible multitudes, are subject to seasons of drought, in which the pools are dried up, the pasturage burnt by excessive heat, and every green leaf or blade withered. Driven by necessity, all the animals hurry from this scene of barrenness; and of these the springbucks are in myriads. They literally inundate the fertile districts, over which swarm after swarm passes like wave after wave, destroying the hopes of the colonists. The grazier drives his flocks and herds to a distant pasturage, dispossessed of his lands till the heavy rains set in; the corn-lands are ruined for the season, and the line of their march is one broad track of desolation. It is not with impunity, however, that the springbucks make these forced incursions. The gun of the colonists thins their numbers; and lions, hyænas, and jackals follow in their train, and prey incessantly upon them. When the rains begin to fall, the horde, thinned by man and beast, begins to return to the interior, and in a few days the whole have disappeared. These migratory swarms are called by the Dutch colonist trek-bokken. Mr. Pringle once passed through one of them, near the Little Fish river; he could not profess to estimate their numbers: they whitened, or rather speckled, the country as far as the eye could reach; there could not have been less in view than twenty-five or thirty thousand. The springbuck is shot in great numbers by the Dutch boors. This sport is usually pursued on horseback, and in the heat of the day. The animal is then lying in its habitual lair, and on being disturbed by the sportsman, springs away with a succession of bounds, than which nothing can be more beautiful or graceful. The Dutch boor is generally an unerring shot; but in case the antelope should be only wounded, the buck-dog (a species of large mongrel) is always at the heels of his master's horse, and, at the report of his gun, darts forward and secures the animal. It is then placed behind the saddle, in the way shown in Fig. 634.

The general colour of the springbuck is light cinnamon-red, a band of deep reddish brown passing along the sides and edging the pure white of the under surface. On the croup is a large patch of long white hairs enclosed by a fold of skin on each side, the edges of which approximate when the animal is quiet, so as to reduce the white to a mere line. In the act of leaping these folds are widely opened, and the long white hairs spread beautifully out, so as to cover the whole of the haunch, producing a striking effect. When taken young the springbuck is easily tamed, and becomes playful and familiar, displaying the confidence and even petulance of the goat, and using its horns in butting, either sportively or in earnest.

Antilope, Ogilby.—Horns in the male only; lachrymal sinuses mobile and distinct; interdigital pores large; inguinal pores large; teats in the female, two; horns annulated and spiral.

635.—The Indian Antelope

(*Antilope Cervicapra*). The saisin, or common antelope of India, is spread over almost every part of that country, residing on the open plains in large herds of females and young, under the guidance of a single old male. They are extremely wary and cautious, and when feeding or lying down to ruminate are guarded by sentinels (young bucks), who give the alarm on the slightest appearance of danger. Their fleetness and activity are such, that greyhounds are useless in the chase. Captain Williamson assures us that he has seen a buck antelope lead a herd of females over a net at least eleven feet high, and that they frequently vault to the height of twelve or thirteen feet, and pass over ten or twelve yards at a single bound. The flesh of this species is dry and unsavoury, but the animal is often hunted, for the sake of the sport, by means of trained chetahs, as described in the history of the latter. (See Felidæ, p. 6.)

The Indian Antelope is about two feet and a half in height at the shoulder, and is lightly formed, but endowed with great vigour. The adult males are of a blackish brown above, and white beneath, the nose, lips, and a large circle round each eye being likewise white; the hair is short and close; the knees are furnished with tufts or brushes. The horns have two or more spiral turns, and are strongly annulated; the Fakirs and Dervishes polish them and form them into offensive weapons by uniting them at the base, so that they are pointed at each end; these they wear in their girdles, instead of swords and daggers, which their vows and religious character prevent them from using. The young males, and also the females, are of a tawny brown, with a streak of silvery grey along each side.

636.—The Pallah

(*Antilope melampus*). This magnificent antelope is a native of South Africa, where it was discovered by Lichtenstein. It inhabits Caffaria and the country of the Bachapins, never descending farther south than the Koosges valley in one direction and the Kamhanni mountains in the other. This species associates in families of six or eight individuals, always residing on the open plains: their swiftness is astonishing, and they leap with great vigour and much in the manner of the springbuck. They are very numerous on the elevated plains in the neighbourhood of Lattakoo, where the natives choose them for the sake of their flesh, which, though deficient in fat, is much esteemed. The Pallah (as it is called by the Bachapins) stands three feet high at the shoulder. The general colour is deep rufous; the lips, eyebrows, interior of the ears, all the under parts, the inside of the limbs, and the region below the tail are white; a black crescentic mark on the croup separates the white from the rufous colour on the back; the outside of the heel and knee are marked by black spots; the horns have an irregular lyrate tendency, bending first forwards and very much outwards, then with a large circular sweep inwards, and finally pointing forward again, approaching within three inches of one another at the tips, after being nearly a foot distant in the middle; they are about twenty inches long in adult animals, and surrounded for two-thirds of their length with irregular rings, often splitting into two, and forming prominent knobs on the front of the horn, but frequently obliterated, and always less strongly marked on the sides, which are slightly compressed.

Madoqua, Ogilby.—Horns only in the male. Lachrymal sinuses distinct, but small. Interdigital pits distinct. Inguinal pores wanting. Teats in the female four. Horns straight.

637.—The Madoqua Antelope

(*Antilope Saltiana*). This beautiful little antelope, which scarcely equals a hare in magnitude, is a native of Abyssinia, where it was first discovered by Bruce about the sources of the Abawi, or eastern branch of the Nile. Specimens are in the British Museum and in that of the Zool. Soc. Of its habits little is known: it is said to live in pairs in mountainous districts, and Pearce informs us that many of the Abyssinians object to eat its flesh, from superstitious motives, because, as they assert, it is often found in the society of monkeys and baboons.

The height of this species at the shoulder is about fourteen inches; the horns are sharp and slightly bent outwards and forwards; the face, forehead, and legs, as well as the tuft of long hair between the horns, are of a bright and deep red, as are likewise the backs of the ears; the neck, shoulders, flanks, rump, and outsides of the thighs are of a clear grey colour, like that of the American grey squirrels, each hair being annulated with alternate rings of black and white; the back, from the shoulders to the rump, is a deep reddish brown, and the breast, belly, interior of the fore-arms and thighs, and hinder surface of the hips, of the most pure unmixed white, forming altogether a variety, clearness, and brilliancy of colouring rarely met with among quadrupeds; the tail is very short, being in fact little more than a mere stump; the ears are round and nearly the length of the horns; the hoofs small, well formed, and, like the horns, of a deep black colour; the forehead is perfectly flat, and the head is compressed suddenly below the eyes, and tapers to a small and attenuated snout; the legs are long in proportion to the weight of the body, and so small that they scarcely equal the little finger in thickness.

Eleotragus.—Horns with a single curve, bending forwards more or less decidedly towards the points, or straight—none in the female. Suborbital sinuses wanting. Inguinal pores large; muzzle naked.

638.—The Reitbok, or Reedbuck

(*Antilope Eleotragus*). The interior of South Africa is the abode of the Reitbok, where it is by no means uncommon, living in pairs or small families, and frequenting the reedy banks of mountain-streams which are dried up during the heat of summer. Sometimes it is found along the borders of the rivers in dense woodland solitudes: plants growing in humid or marshy situations are its food.

The Reitbok is about two feet ten inches high at the shoulder. The hair over the neck and body is long and rough, and of a dull ashy grey, sometimes tinged with red; the under parts and inside of the limbs are silvery grey. The tail is long and bushy. Beneath the ears on each side of the head is a naked oval space of a shining black colour. The horns curve forwards very boldly, and are annulated at the base with prominent rings.

Bush Antelopes.—The animals so termed are of a compact form and low in the limbs, which are slender but vigorous. The hair is smooth and usually close; the neck is short, and held almost horizontally, and the back is arched. The horns are straight and short, and situated high on the head, at a considerable distance from the eyes; in one subgenus they are possessed by females as well as males. There is no suborbital sinus, but its absence is compensated for by a long maxillary gland running down each side of the face between the angle of the eye and the muzzle, indicated by a naked space on the skin, of a black colour, and moistened by a peculiar secretion. These animals live singly or in pairs, frequenting jungles, dense reed-beds, and the underwoods of forests, most preferring hills or mountain-districts of moderate elevation. When pursued, they dive through the thicket, and quickly disappear.

Tragulus, Ogilby.—Horns in both sexes, maxillary glands oblong, interdigital pores wanting, inguinal pits wanting, teats in the female four.

639.—THE KLEENBOK

(*Antilope perpusilla*). This little antelope is a native of South Africa, and lives singly or in pairs among the bushes, in the covert of which it hides itself so completely, that it is not often to be seen even where it is abundant. It is very active, shy, wary, and timid, and displays great address and cunning in eluding pursuit. When domesticated it becomes very familiar, will distinguish persons about it, and answer to its name when called. This species is the A. pygmæa of Desmarest, who confounds it with the Guevi of Senegal: it is also the A. cœrulea of Col. H. Smith.

The height of the Kleenbok at the shoulder is about a foot, the head is long and pointed. The general colour is dark slaty brown, passing in the under parts to ashy grey: the forehead and nose are brown bordered on each side by a line of sandy red, the legs are reddish brown, the horns are small and straight, not more than an inch and a half long in the male, nearly an inch in the female.

CAPRIFORM ANTELOPES.—Head heavy, neck short, contour robust, limbs strong, hoofs adapted for rocky or mountain situations, horns small or moderate, hair coarse and deep or harsh and wiry.

Rupicapra. Horns common to both sexes, rising immediately above the orbits, at first vertically, then hooking abruptly backwards, small and smooth with sharp points, lips hairy and attenuated, suborbital sinuses wanting, inguinal pores and post auditory sinuses, teats of females two.

640, 641, 642.—THE CHAMOIS

(*Antilope Rupicapra*). This celebrated animal is found in all the alpine chains of Europe and Western Asia, in the Alps, the Pyrenees, the Carpathian and Grecian mountains, and the ranges of Caucasus and Taurus. Everywhere it tenants the loftiest ridges, displaying the most astonishing activity. During the summer it is only to be found on the mountain tops, or in sequestered rock-girt glens where the snow lies unmelted throughout the year; but in winter it descends below the line of perpetual snows to the grassy slopes, where it becomes doubly cautious and wary. Its senses of hearing, sight and smell are extremely acute, and it scents the approaching hunter at the distance of half a league. When its fears are once excited, it bounds from rock to rock as if to gain a view of the surrounding district, uttering at the same time a singular hissing sound; but no sooner has it caught sight of its enemy than off it bounds, scaling the most fearful rocks, clearing chasms and leaping from crag to crag with amazing rapidity. Its course is not stopped by a perpendicular precipice of twenty or thirty feet in depth: with astonishing boldness it takes the leap, striking the face of the rock repeatedly with its feet, for the purpose both of breaking the fall and of directing itself more steadily to the point it aims at. It pitches on the smallest ledge, where the eye of man scarcely discerns room for its foot; and it traverses with security the beetling shelf that overhangs the deepest abyss. The perils of the chamois hunter have been too often narrated to need repetition: his life is one of perpetual jeopardy: he is like a man infatuated by a spell, and though he knows the awful risk he runs, yet to the chase is he impelled by the same feelings which urge the gamester in a career of ruin. The sketch (Fig. 643) represents the dangerous situation of two celebrated hunters in 1826, and is copied from a print published at Basle.

The food of the chamois consists of mountain herbs and flowers, and the tender shoots of shrubs: it seldom drinks, but is extremely partial to salt, and many stones are met with in the Alps hollowed out by the continual licking of the chamois, on account of the saltpetre with which they abound.

At the root of each horn on the back of the head there is a sinus or opening of the skin, which does not seem to be connected with any gland, nor is its use understood. The females produce one, rarely two kids in March or April. The chamois exceeds two feet in height: the whole body is covered with long hair of a deep brown in winter, and brownish fawn colour in summer, the chaffron, muzzle, and sides of the lower jaw are white or straw-coloured, the tail is very short.

Mazama, Ogilby.—Horns in the male only compressed laterally at the base, diverging as they rise upwards, then hooking backwards and inwards, rough and scabrous, and giving off above their base a bold, compressed, pointed prong directed forwards, lips hairy; neither inguinal pits nor lachrymal sinuses; interdigital pits distinct, teats in the female, four; knee-brushes large, accessory hoofs wanting.

644.—THE PRONGBUCK

(*Antilope Furcifer*). The Prongbuck is a native of the western parts of North America, from the 53° of north latitude to the plains of Mexico and California, presuming that it is identical with the animal described by Hernandez as the Mazama. It is gregarious in its habits, frequenting wide open plains or hills of moderate height, but is never found to inhabit forests or closely-wooded districts. It migrates from north to south, according to the season. On the banks of the southern branch of the Saskatchewan, and on the upper plains of the Columbia river it is very numerous. The Prongbuck is compactly formed, active and vigorous, and, on firm ground, will outstrip most animals; but after a slight fall of snow a good horse will easily overtake it. These animals, like many other Ruminants, display a sort of stupid curiosity at the sight of novel objects, which, as Dr. Godman states, the Indians, and even the wolves turn to their own advantage. If they crouch down, assume strange postures, now move forwards, now stop, or play antics, the prongbucks wheel round and round the object of their attention, decreasing their distance at every turn, till at last they approach near enough to be killed by the Indian or sprung upon by the wolf. Their flesh however is not in any estimation, and it is only in times of scarcity that the Indian will take the trouble of hunting them. The females produce one or even two kids early in the month of June. The prongbuck stands three feet in height at the shoulder; its body is covered with closely compacted hair standing out from the skin, and of a most singular texture: it is tubular or hollow like a quill, but so brittle and devoid of elasticity that it snaps with the smallest effort, and when pressed between the thumb and finger crushes like a dry reed, and never regains its original form. On the head, ears, and legs the fur is close and of the ordinary quality, that on the body is two inches long, but down the back of the neck it is six inches in length, and forms a mane. The general colour is pale fawn, the hairs being of a bluish tint at the roots; the under parts and inner aspect of the limbs are white; a broad disc of white surrounds the tail, and passes over the croup; and the throat is marked also with two transverse white bands. This, it must be observed, is the winter dress of the animal; in summer the new coat which it then acquires consists of hair of the ordinary quality, which as the winter comes on gives place to the covering described.

Nemorhedus, Smith.—Horns short, parallel, curved gently backwards, annulated at the base and longitudinally striated, in both sexes; muzzle naked. Suborbital sinuses in the form of a circular orifice. Neither inguinal pores nor knee brushes. Limbs stout. Fur harsh and wiry, a nuchal mane. Teats four.

645.—THE CAMBING-OUTAN, OR WILD GOAT OF THE MALAYS

(*Antilope Sumatrensis*, Desm.) In aspect and manners the Cambing-outan resembles the common goat and the ibex: it inhabits the forests which clothe the mountains of Sumatra, and is bold and active. The Cambing-outan stands about two feet three inches in height at the shoulder, and is covered with long coarse hair of a dark brown or black colour; the mane along the back of the neck being white, and the hair on the lower jaw being of a straw colour. On each side of the muzzle there is a naked linear space, the suborbital sinuses are small. This species is closely allied to the Thar of the Nepal Antilope Thar, Hodgson. In this group the Goral of Nepal (Antilope Goral, Hardwick) is placed by Mr. Hodgson, Zool. Proceeds. 1834, p. 85; but it has no suborbital sinuses, nor is the muzzle entirely naked. It will form the type of a distinct subgenus (Kemas, Ogilby).

BOVIFORM ANTELOPES.—As the antelopes of the last section approximate to the true goats, so on the other hand do the animals of this section approach the oxen. They do not however all display an equal degree of proximity, some indeed, as the Nyl Ghau, are closely allied to groups among the true antelopes, while others have nothing of the antelope in form or appearance. In general they are distinguished by their massive contour, large size, and powerful limbs, conjoined with a heavy head, short neck, and elevated withers. The horns are large, often very thick and solid, and the eyes small: they are in fact bovine in their contour and habits, and gradually link on with the genus Bos. In those which approach the nearest to this genus there are horns in both sexes.

Tragelaphus, Ogilby.—Horns in the male only. Suborbital sinuses large. Interdigital fossæ distinct. Inguinal pits wanting. Muzzle broad and naked. Teats in the female four.

646, 647.—THE NYL-GHAU

(*Antilope picta*). This magnificent species, which stands upwards of four feet in height at the shoulder, is a native of the dense forests of India, where it resides alone or in pairs, it is extremely vicious, resolute, and powerful, and will turn upon its pursuers with great fury. Even in confinement it is not to be approached without caution. Previous to making its attack it drops upon its fore-knees, and in that attitude gradually advances, till within a certain distance of its foe, when it darts suddenly forward with amazing force and velocity. Bold and spirited, however, as it is, it is the most common prey of the tiger. During the day the nyl-ghau lurks in the covert of the forest, whence early in the morning or during the night it wanders forth to feed, invading the adjacent corn-fields and cultivated lands. This species is often bred in captivity both in this country and in India. The female usually produces two at a birth.

The male considerably exceeds the female in size. The general colour is slaty blue, in the female tawny red. The lips, chin and under parts are white, there is a large white spot on the throat, two smaller ones on the cheeks, and one in the front and two in the rear of each pastern joint. The young males resemble the females in their colour, which is exchanged for slaty blue on arriving at maturity. A bunch of long pendant hair hangs from the fore part of the neck, and a similar tuft terminates the tail.

The limbs of the nyl-ghau are well formed, but when the animal is standing are gathered close under the body, and the tail is drawn in between the hind-legs. Mr. Ogilby regards this animal as the Hippelaphus of Aristotle. It is placed by the author of the article on Antelopes in the 'Penny Cyclopædia' in the same group with the Steenbok, Grysbok, and Klipspringer of Africa, but it has neither their form nor habits.

Kobus. Horns only in the male, long, stout, nearly straight, inclined backwards, with a slight inward tendency. *Inguinal pores distinct.* Suborbital sinuses wanting. Muzzle broad and naked. Teats in female four.

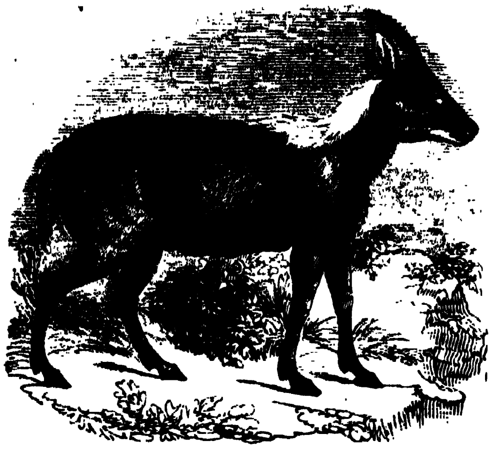
648.—THE KOBA, OR SING SING

(*Antilope Koba*, Ogilby.) This species is the 'grande vache brune' of the French of Senegal, of which country it is a native. It equals the common stag in stature, and is covered with a coat of long rough hair; a rough bristly mane runs down the back of the neck. The general colour is dark sandy red, passing into grey on the under parts, the face and limbs are dark brown or black; the lips, chin, and a stripe over each eye are white. Of the native habits of the koba little is known, in captivity, judging from the specimens we have seen, it is a gentle and quiet animal. When at rest its attitude resembles that of the nyl-ghau. An allied but smaller species, the Kob, or 'petite vache brune' of the French, inhabits Western Africa. The figure (648) of the koba represents the female.

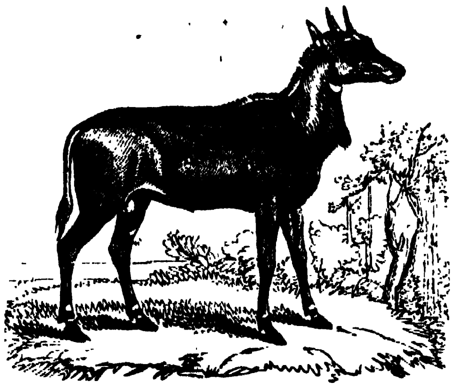
Oryx. Horns in both sexes long, erect, annulated; muzzle nearly naked or quite, interdigital pits large; neither suborbital sinuses nor inguinal pores; teats of female four.

649.—THE ADDAX

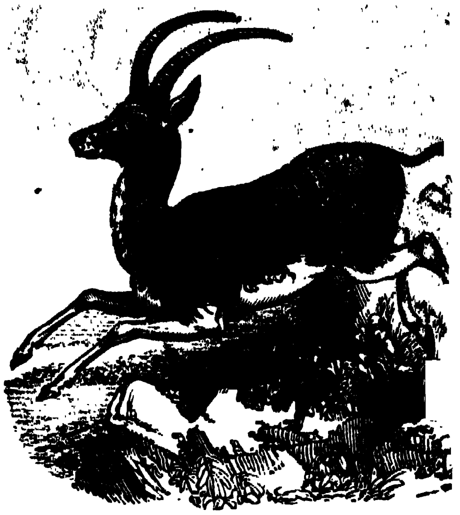
(*Antilope Addax*, Licht.) This animal is the Strepsiceros of Pliny, which he states is termed by the Africans Addax, or Addas; and according to Ruppell and Hemprich and Ehrenberg, who may be said to have rediscovered this species in Dongola, it is denominated Akasch or Akas or Addas by the Arabs with the additional prefix of Abu, "father"—thus Abu Addas, a title they bestow on many other animals, as for example the sacred ibis, which they call Abu Hannes or Father John. The addax appears to be widely spread in Central Africa, tenanting the deserts in pairs, or perhaps small groups; but of its habits we have no detailed accounts. It stands three feet in height at the shoulder, and is heavily made, the head is large, the neck thick, and the legs robust. The horns are long and round, rather slender in proportion to their length, twisted outwards and describing two turns of a wide spiral, annulated to within five or six inches of the points, which are smooth and sharp, the form of the horns of the female does not differ from that of the male, but in the young they are almost straight. The ears are pretty long and proportionally broader than in most of the smaller antelopes, and the tail reaches almost to the hough, and is terminated by a switch of long, coarse, grey hair. The whole head and neck, both above and below, are of a deep reddish brown colour, except a transverse mark of pure white across the lower part of the forehead between the orbits, which expands on the cheeks and half surrounds the eyes, a patch of black curly hair surrounds the root of the horns, and there is a scanty beard of the same colour on the larynx, all the rest of the animal, including the entire body from the neck backwards, as well as the legs and tail, is greyish white, the hoofs are black, and remarkably broad, to enable



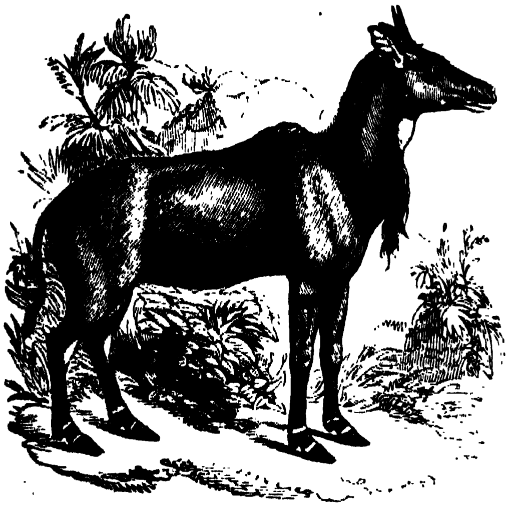
645.—Wild Goat of the Malays.



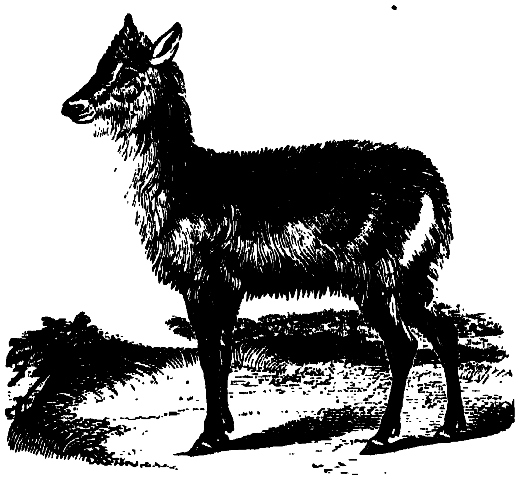
646.—Nyl-ghau



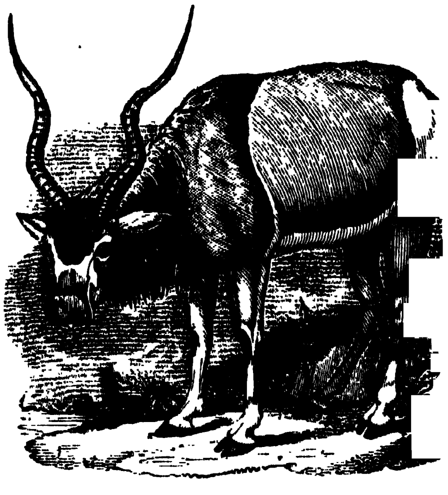
650.—Blauwbok.



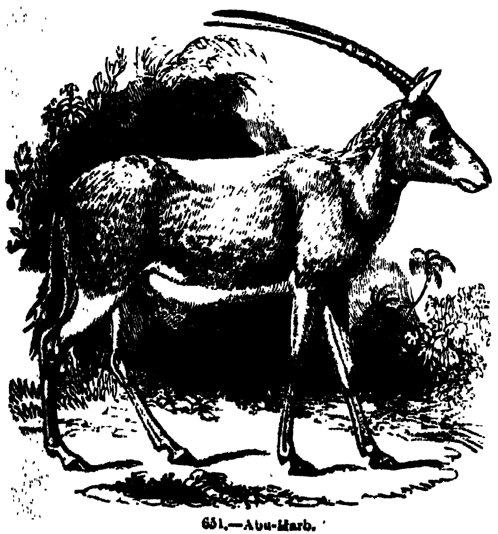
647—Nyl ghau.



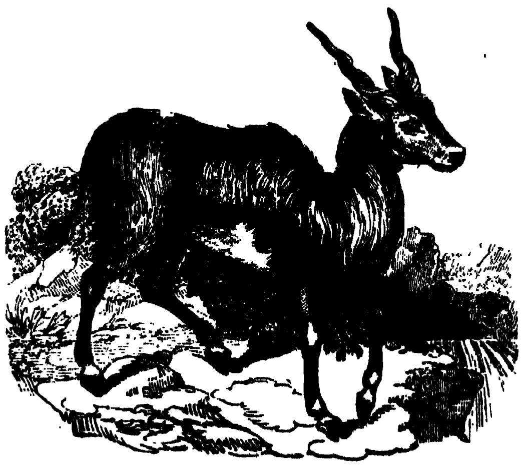
648—Koba.



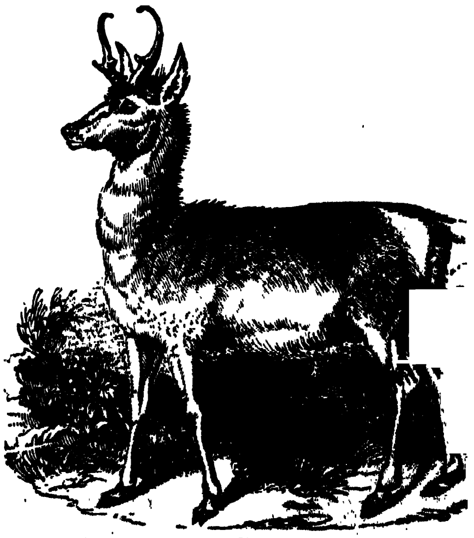
649.—Addax.



651.—Abu-Harb.



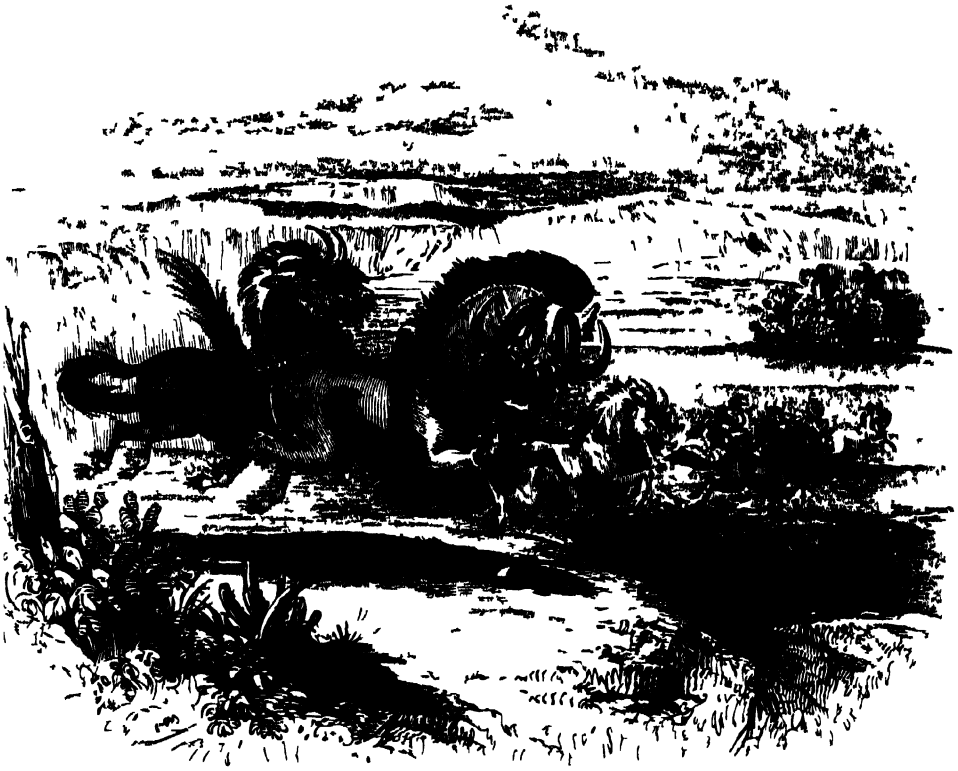
652.—Canna.



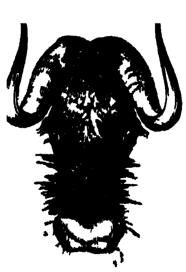
653.—Prongbuck.

655.—Wild Ox of Atlas.

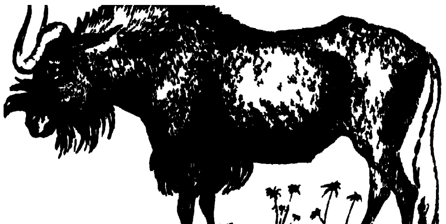
[illegible]



654.—Koodoo.



659.—Head of Gnu.



658.—Gnu.

the animal to pass more easily over the fine and loose sands of the deserts in which it resides.

650.—The Blauwbok

(*Antilope leucophæa*). This antelope is a native of South Africa, and was formerly common within the boundaries of the Cape Colony, where it is now never seen. It occurs in the extensive open plains north of the Gariep, living in pairs or small families of five or six. It is a bold and fierce animal, and when wounded will turn upon the hunter with great resolution. At certain seasons it is reported to attack indiscriminately every animal that approaches near it. The blauwbok stands three feet seven inches in height at the shoulder: the horns exceed two feet in length, and are formidable weapons; they are round, uniformly curved backwards, and marked with from twenty to thirty prominent rings; the points for the extent of six inches, are smooth, and terminate very acute. The term blauwbok, or blue-buck, has been given to this animal by the Dutch colonists from its peculiar hue, resulting from the colour of the hide, which is deep black, being reflected through the ashy-grey hair that covers it, giving it a general dark-blue tone.

651.—The Abu-Harb

(*Antilope leucoryx*). This species is the Oryx of the ancients, a term now given to an allied South African species, but which of right belongs to the Abu-Harb, which lives in large herds in Sennaar and Kordofan, feeding principally on the leaves of various species of acacia. It is represented in abundance on the monuments of Egypt and Nubia, and in particular in the inner chamber of the great pyramid at Memphis, where a whole group of these antelopes are represented, some driven forward, others dragged along by the horns, or by a cord around their neck, apparently as trophies brought from a conquered country, or a tribute or present from some subjugated nation.

This animal nearly equals the addax in size. The horns are long and slender, arched gently backwards, annulated at the base, and very sharp at the points. The tail is long and tufted at the extremity with black and grey hairs mixed together. The hair on the head, body, and extremities is universally short, and lies smoothly along the hide, except upon the ridge of the back, where it is rather longer and reversed, or turned towards the head in a direction contrary to that on the other parts of the body, and forming a short reversed mane from the middle of the back to the occiput. The head is white, with a brown mark descending perpendicularly from each orbit, and expanding over the cheek, and a similar stripe passing down the centre of the face from the horns to the muzzle; the whole neck also, on the throat as well as on the upper part, is of a uniform rusty-brown colour, but, with these exceptions, all the rest of the body, as well as the legs and tail, are milk-white.

652.—The Oryx

(*Antilope Oryx*). The oryx is a native of South Africa, and differs from the Abu-Harb in having the horns straight: there is a large black mark on the forehead, united with a broad stripe across each cheek.

This powerful antelope is found in the karroo south of the Orange river, and is resolute and dangerous when hard pressed, using its long sharp horns with amazing energy and address, often transfixing several of the hunter's dogs before he can get within shot. The horns measure three feet in length.

653.—The Canna

(*Antilope Oreas*). The Eland or Elk of the Dutch colonists of the Cape: the Impoof of the Caffres.

The canna is a native of Southern Africa, and the largest of all the antelopes, if it can be so termed, measuring full five feet in height at the shoulder, and weighing from seven to nine hundred weight. The horns in the male are large and heavy, measuring a foot and a half in length, nearly straight, sharp at their points, and surrounded almost to the top with a thick prominent spiral wreath. In the female the horns are smaller, and often almost destitute of a wreath. The muzzle is naked; the neck is thick and compressed at the sides, as in the ox, with a large protuberance on the throat, and a deep-hanging dew-lap. From the centre of the forehead to the tail runs a short and nearly erect mane, of dark-brown hair, which is reversed along the back of the neck, but directed in the usual way along the dorsal spine. The shoulders are very much elevated, the processes of the vertebræ being greatly elongated at the withers. The tail ends in a black tuft. The general colour is reddish fawn above; white on the under parts; an ashy-grey tint generally prevails on the head and neck.

The flesh of the canna is in high estimation, consequently the animal is much sought after. Unlike antelopes generally, it acquires fat, and indeed often becomes so loaded with it as to be incapable of much exertion. It is asserted that when the animal is hard run, a red oily perspiration has been seen to ooze from the pores of its skin, and that it will sometimes drop down from plethora. The canna is mild and gentle, living in large herds upon the plains and low hills, the old males generally residing apart: so little suspicious are they, that a horseman may ride through the very midst of a herd without causing any alarm, and in this way the sportsman may easily pick out and bring down with his gun the largest and the fattest. The well-conditioned males are generally chosen, and to such an extent have the herds been thinned of these, that some have been seen without a single male among them. The parts of this bovine antelope most esteemed are the large muscles of the thighs, which, when cured and dried, are termed thigh-tongues, from their flavour and fineness of grain.

Calliope, Ogilby.—Horns only in the male: no lachrymal sinuses nor interdigital pores; inguinal pits distinct; muzzle naked; horns spiral; teats in female four.

654.—The Koodoo

(*Antilope Strepsiceros*). This magnificent antelope is about four feet in height at the shoulder, and is heavily and robustly made, more resembling in external appearance an ox than an antelope. The muzzle is broad and naked; the ears large and slouching; the limbs thick and muscular. The horns of the male are about four feet in length, very thick at the base, and beautifully twisted into a wide sweeping spiral of two turns and a half, surrounded by a prominent wreath, or rather keel, which follows their flexure; they spread boldly outwards, and the animal generally carries them thrown back on the shoulders, partly for the sake of keeping them from striking against branches or becoming entangled in brushwood, and partly on account of their great weight.

The koodoo is a native of South Africa, and is found along the wooded borders of the rivers of Caffraria, living in small families of five or six individuals, and feeding on the shoots and leaves of trees and bushes. Desmarest says it leads a solitary life in mountain districts, but in these respects he is in error; it dwells neither on the hills nor the open plains, but in the wooded tracts following the course of rivers; nor is it solitary. When chased, it takes to the water, and swims vigorously; and though heavy, it leaps with wonderful agility. Desmarest says it takes bounds of surprising extent, and it has been seen to clear the bars of a gate of the height of ten feet, though it had but a very limited space for gaining the impetus necessary for the leap. When hard pressed, the males are formidable from their immense strength and determination, and from their formidable horns, which they wield with great address. The koodoo, however, when taken young, is easily tamed, and becomes quiet and gentle.

The general ground-colour of the koodoo on the back and sides is a light fallow-brown, with a narrow white ribbon along the spine, and eight or ten similar bands descending from the back and passing obliquely down the sides and hips; the belly and under parts are pale silvery brown. On the neck and withers is a thin spare mane of a brown colour, and the chin, throat, and breast are furnished with similar long hairs, forming a species of beard. The cheeks are marked with two or three round white spots, and a narrow grey line passes from the anterior angle of the eye down towards the muzzle. The tail is moderately long, and equally covered with short hair.

Bubalus, Ogilby.—Horns in both sexes heavy, thick, and annulated, first inclined forwards, then suddenly bent backwards, making a bold angle in front. Lachrymal sinuses minute. Interdigital pits large. Inguinal pores wanting. Muzzle half naked. Teats in the female two.

655.—The Bekr-el-Wash, or Wild Ox of the Arabs

(*Antilope Bubalus*). This animal is the Bubalus of the ancients; the "animal Africæ proprium, vituli cervive quâdam similitudine" of Pliny. Its representation occurs among the figures on the monuments of Upper Egypt. This animal is spread throughout a great extent of northern Africa, living in numerous herds on the confines of the Tell, or cultivated district, and the Sahara or Great Desert. According to Captain Lyon, it is found on the mountains south of Tripoli. Though Barbary may be regarded as its real habitat, yet it is not altogether limited to that extent of country, for it sometimes crosses the Libyan desert, and gains the banks of the Nile; and was once probably common in Upper Egypt.

The Bubalus, or Bekr-el-Wash, is as large as a heifer, and very bovine in appearance; the head is singularly long and narrow, with a straight flat chaffron; hence the eyes appear as if placed high in the head. The shoulders are elevated, and the neck resembles that of the ox; the general colour is red-brown, a black tuft of long hair terminating the tail.

The bubalus is easily tamed, and, according to Dr. Shaw, of so familiar a disposition, that the young calves frequently mix with domestic cattle, and soon learn to attach themselves to the herd without attempting to escape afterwards. The male bubalus in its mode of combat resembles the bull; he lowers his muzzle to the ground, and striking upwards, or from side to side, endeavours to gore and toss his antagonist with his horns, which are very formidable weapons.

There is in South Africa a species very nearly allied to the Bekr-el-Wash of Barbary, termed by the Dutch the Hartebeest (A. Caama, F Cuvier). It resides in large herds, and is an object of the chase, its flesh being very finely flavoured, and more nearly resembling the beef of the ox than that of any other animal except the canna. It is moderately fleet, its pace when at full speed resembling a heavy gallop; but when at some distance from its pursuer, it will stop and turn to gaze, as if to ascertain whether he be followed or not—a habit which operates to its disadvantage. It is mild and tractable; but when hard pressed, and infuriated by wounds, it uses its powerful horns with great effect, dropping on its fore-knees, and in this position advancing towards its enemy, and then suddenly darting forwards with great force and rapidity. The Hartebeest has rather an extensive range, being found in the Cape Colony, as well as almost everywhere between it and the tropic of Capricorn. In the former locality, however, it is now only found on the extensive flats bordering upon the Caffre frontier. Another allied species is the Sassaby, or Bastard Hartebeest (A. lunata). Though this species (as it is stated in the catalogue of the South African Museum) is not known to occur so far south as the Colony, yet it is tolerably abundant in the neighbourhood of Lattakoo, and very much more so between 26 and the tropic of Capricorn. In the latter locality especially it is found, like the Hartebeest, in herds of from six to ten or even more individuals, and chiefly frequents flat and wooded districts. Where fire-arms are used, or where the necessities of natives have made them indefatigable in the chase, this animal is vigilant and shy; but in situations where it has been left in comparative peace, it regards the approach of man with curiosity, almost unmixed with fear; just discontinuing to feed, and raising its head to gaze, but never attempting to fly, unless he approach very close. Its flesh is fully as valuable as that of the Hartebeest.

Catoblepas, H. Smith.—Horns in both sexes, commencing in a dense mass covering the top of the forehead, whence they sweep downwards over the eyes, and then turn boldly upwards, terminating in sharp round points. Head heavy and ox-like; muzzle very broad and muscular; and the nostrils covered by a large moveable lid, continued from the skin of the muzzle, and capable of being opened or shut at pleasure. Suborbital sinus reduced to a small gland in the skin, concealed in a tuft of hair. No inguinal pores. Females with two teats. A full mane runs down the neck. Tail furnished with long hairs and bushy.

The animals belonging to this generic group are remarkable for the singularity of their form, which partakes of that of the horse and buffalo. The head and horns are those of a buffalo; the eyes are large, wild, and expressive of a savage and vindictive disposition. The neck, with its mane, the tail, and the general contour of the body are those of the horse; the legs are well turned and vigorous, resembling those of the stag. The action and gallop of these animals (the Gnus) are so much like those of a horse, that a troop of them seen scouring the plain at a distance might easily be mistaken for zebras or quaggas, were it not for the difference of colour. Besides the mane down the back of the neck, the chaffron above the muzzle is furnished with a tuft of long, diverging, bristly hairs, and the chin and throat are also covered with hairs of a similar character, forming a shaggy beard, while a full mane flows down from the chest between the fore-limbs.

656, 657, 658.—The Gnu

(*Antilope Gnu*), T'Gnu of the Hottentots. The gnu equals a well-grown ass in size, exceeding four feet in height, and is a native of the wild karroos of South Africa and the hilly districts, where it roams mostly in large herds, which migrate according to the season. The extent of its range in the interior regions is not known; as far, however, as travellers have penetrated, herds have been met and chased, for its flesh is prized as food both by the natives and the colonists. They are, however, extremely wild, and not to be approached without difficulty. On the first alarm, away scours the troop, not in a tumultuous mass, but in single file following a leader. Their speed, as might be expected from the vigour and compactness of the body and limbs, is very great. Sometimes, however, when any object of apprehension appears, they do not exert it, but plunge about, flinging out their heels, butting, and tossing up their heads, and exhibiting emotions of violent fury. It is seldom, however, that they venture upon an attack, unless hard pressed or wounded, when they defend themselves with desperation, dropping on their knees, they dart forward upon their assailants with extraordinary force and impetuosity, and unless he be cool and prepared he cannot escape his fate.

Mr. Pringle assures us that the gnu taken young will become as domesticated as the cattle of the farm, with which it associates harmlessly, going and returning to pasture; it appears, however, that few farmers like to domesticate it, as it is liable to a cutaneous eruption which it communicates to the cattle, and which is invariably fatal. In confinement the gnu often becomes ferocious, and is not to be approached without caution; the females are less dangerous than the males, and more easily manageable.

The general colour of the gnu is deep umber-brown verging upon black, the tail and mane are grey; the latter indeed is nearly white. Fig 656 represents a herd of gnus on the karroo, Fig 659, a front view of the head of the animal, which may be compared with the characters we have detailed. Besides the common gnu, two other species of this genus are known. The first is the Kokoon, as the Booshwanas term it (A. taurina, Burchell). It is larger than the preceding species, with which, though inhabiting the same districts, it never associates; it is far less daring than the gnu, and is sometimes found solitary, but most frequently in herds, which wander over the vast plains of the interior.

The next species is the Brindled Gnu (A. Gorgon, H. Smith): little is known respecting it, and it appears to be comparatively rare, and is perhaps restricted to certain territories beyond which it does not wander.

A specimen exists in the Museum of the London Missionary Society, which was brought from South Africa. It is certainly very distinct from either of the preceding animals.

So far then as the specimens in our 'Pictorial Museum' permit, have we endeavoured to give a sketch of the Antelopes, a family which, as it usually stands in systematic works, consists of a number of distinct forms or genera, all assorted under one head, and exhibiting very different degrees of relationship to each other. When we compare the Canna on the one side, and the Pronghorn on the other, with the Gazelle of the desert, we see few points of affinity, and are forced to the conviction that the division-line between the family "Antelope" of most writers, and that of the ox and the goat, is purely arbitrary. Our object has been, without departing from our plan of clothing science in a popular dress, to convey some idea of the principal groups, as illustrated by our pictorial specimens, into which the Antelopes are resolvable, and to delineate succinctly the habits and manners pervading each group, or displayed by the more remarkable species. Though we have given generic titles and definitions, yet we have used the term "Antilope," throughout, in the specific name of each animal, as being more familiar to general readers than such words as Catoblepas, the title of the genus comprehending the gnu, Calliope, that of the koodoo, &c., deeming it sufficient to have stated them, and noted their characters at the head of each genus. Those who wish to investigate this subject at length, may consult Col. Hamilton Smith's 'Treatise on the Ruminants,' in Griffith's translation of the 'Règne Animal' of Cuvier, and a paper by Mr. Ogilby, in the 'Zool. Proceeds.' for 1836, p. 132, et seq.

Goats and Sheep.—Though the domestic races of goats and sheep, as we are accustomed to see them in Europe, exhibit marked distinctive features, yet the diagnostics fail us in a great measure when we turn to the breeds of sheep in other countries, which exhibit a greater length of limb, a more goat-like form of body, and a clothing of hair, and it is from paying attention to domestic breeds, rather than to truly wild species, that naturalists have been inclined to consider both goats and sheep as generically the same, seeing that it is for the most part in countries where the domestic sheep is woolly that its difference from the goat is at once palpable. "So little," says Cuvier, "do the sheep deserve to be generically separated from the goats, that they even produce together a mixed fertile race," an assertion we query. Again in the 'Zool. Proceeds.' 1834, Mr. Hodgson, after a long table of differences between sheep and goats, adds, "After all, there are no physical distinctions at all equivalent to the moral ones (those deduced from temper and disposition of the two species) so finely and truly delineated by Buffon, and which, notwithstanding all that Col. Hamilton Smith urges in favour of the courage and activity of the sheep, will even be recognised as the only essential diagnostics of the two genera." If there are, indeed, no other distinctions, the "moral ones" are nothing, for the wild species of goat and sheep are not so contrasted in disposition; and even if they were, it is not from such points that the naturalist has to deduce generic characters.

In the goats, and also in the sheep, there are horns in both sexes, there are also glandular interdigital pits in the sheep and goat, and they are alike formed for rocky or mountain abodes, the muzzle is small and hairy. The females have two teats. The goats have the horns compressed laterally, rugose on their anterior aspect, and arching upwards and backwards; there is no suborbital sinus. The sheep have the horns voluminous, turned to the sides, curling downwards, and often making a double flexure. There are deep suborbital sinuses, with a linear orifice incapable of being expanded, and, unless sought for, not to be seen amidst the wool or dense hair. Besides these characters, the chaffron is generally more arched in the sheep than the goat, and the latter has mostly the lower jaw furnished with a beard. Neither have inguinal pores.

Genus Capra—the Goats.

660.—The Common Goat

(*Capra Hircus*, Linn.). Αἲξ (ὁ καὶ ἡ, but generally used for the female), τράγος, χίμαρος (the male), ἔριφος (young male kid of three or four months), χίμαιρα (young female before its first winter), of the Greeks, Caper and Hircus (male), Capra (female), Hœdus, or Hædus (a young male kid), Hœdulus, or Hœdillus (a very young male kid, or kidling, ἔριφος), Capella (female kid), of the ancient Italians, Becco (male), Capra (female), Capretto, and Caprettino (kid and kidling), of the modern Italians, Bouc (male), Chèvre (female), Chevreau (kid), of the French; Cabron (male), Cabra (female), Cabrito (kid), of the Spanish; Cabram (male), Cabra (female), Cabrito (kid), of the Portuguese. Bock (male), Geisz (female), Bocklein (kid), of the Germans, Bok (male), Geyt (female), of the Dutch, Bock (male), Geet (female), Kidh (kid), of the Swedes, Buk, Geedebuk (male), Geed (female), Kid (kid), of the Danes, Bwch (male), Gafr (female), Mynn (kid), of the ancient Britons.

As is the case with almost every domesticated quadruped, great uncertainty hangs over the origin of the goat. Some naturalists refer it to the Ibex of the European mountain-ranges, others regard it as descended from the Paseng of Persia (Capra Ægagrus) or from the Caucasian Ibex (Capra Caucasica, Guldenst.). Cuvier says that the Ibex of the European Alps, as well as that of the Caucasus, breeds freely with the common goat, producing a fertile progeny; and there were in the Garden of Plants at Paris, goats of very large stature, taken wild on the Alps and Pyrenees, the produce, as asserted, of the Ibex with the common goat. After all, however, nothing positive can be ascertained on the point in question, it is one of those which must be left in abeyance. The subjugation of the goat, whatever may be its primitive stock, took place at a very early epoch, and it is evident that the flesh of the kid was accounted a delicacy. There was formerly in Syria, as there is at the present day, a breed of goats with long pendent ears, and fine long hair fit for the manufacture of some kinds of stuffs. In this respect they perhaps resembled the Angora goat (Angora is in Anatolia, Asiatic Turkey). We read that the Israelites made curtains of goats hair as a covering for the Tabernacle, and the modern Arabs manufacture the cloth of their tents from the hair of the long eared breed, which is generally of a black colour, and which they prefer to the hair of the camel. The females of this breed yield excellent milk in profuse quantity, and are therefore much esteemed. Burckhardt notices a very fine breed of goats of this race in the valley of Baalbec, which he says are not common in other parts of Syria, they have very long ears, large horns, and long hair, but not silky like that of the goats of Anatolia. The hair of the goats of Italy in the time of Virgil was long, but of coarse quality. In the 'Georgics' (lib. iii.) the shepherds are directed to shear the beards and long hair of the Cinyphian goats for the service of the camp, and for garments for the mariner. Varro also observes that goats were shorn for the use of sailors, for coverings to engines of war, and to workmen's instruments. From the earliest antiquity the milk of the goat has been in requisition, and in the present day the goat and sheep in Syria* take the place of the cow, if not exclusively, to a great extent.

From the beginning of April to the beginning of September, the towns are supplied with milk by large herds of goats, which pass through the streets every morning, and are milked before the houses of the customers. The products of the milk are furnished in abundance at the same season. In Switzerland, flocks of goats are kept for the sake of their milk, and our classical reader will remember the lines in Virgil ('Georgics,' lib. iii.) which are still applicable, "Pascuntur vero sylvas," &c. Besides the long-eared and long-haired race of Syria, of which Figs. 661, 662, and 663 are representations, there is also a breed closely resembling that common in Europe: among other races, we may here notice the Dwarf African, with close hair, almost beardless, and with a little pendulous tassel-like excrescence of skin hanging from each side of the throat: of this breed we have seen specimens in England.

The most celebrated variety of the domestic race is the goat of Cashmir (Figs. 664 and 665), which produces a wool of exquisite fineness, from which are manufactured the costly Cashmir shawls, not to be purchased even in the country where they are wrought but at a great price. This goat is spread through Thibet, and in the country of the Kirghiz, at the bend of the Ural, north of the Caspian Sea; it is covered with silky hair, long, fine, flat, and falling, and with an under-vest in winter, of delicate greyish wool, and it is this wool which constitutes the fabric of the shawls. The average weight of wool produced by a single goat is about three ounces, and it sells in Thibet for about five shillings a pound: ten goats are required to furnish sufficient wool for a shawl a yard and a half square. It appears that in Thibet the wool is first combed from the goats in the mountains and sent to Cashmir, where it pays a duty on entry. It is there bleached with rice flour, spun into thread, and taken to the bazaar, where another tax is paid upon it, the thread is then dyed, and the shawl is woven and the border sewed on; but the weaver has now to carry it to the custom-house, where a collector puts on it any tax he pleases, and in this he is only limited by the fear of ruining the weaver, and consequently losing future profit. All the shawls intended for Europe are packed up and sent to Peshawer across the Indus: this part of the journey is generally performed upon men's backs, for the road is in many parts impassable, even by mules, being across deep precipices, which must be traversed by swinging bridges of ropes, and perpendicular rocks, which are climbed by wooden ladders. At each station of this toilsome journey, which lasts twenty days, a tax is paid, amounting to about two pounds sterling for the whole journey. From this point till they come near the confines of Europe, in addition to the many custom-houses at which they must pay tribute, these valued articles of merchandise are exposed to the marauders of Afghanistan and Persia, and to the Turkomanee hordes, whose forbearance must be purchased at a high price. After leaving Persia, many shawls get to Europe over the Caucasus and through Russia, but the largest number reach Constantinople through the Turkish provinces.

In April, 1819, M. Jaubert, under the French government, succeeded in bringing a flock of Thibet goats with great loss and difficulty, from the Kirghiz territory to France, but the small produce of wool obtained from each animal precluded all hope of making a profit by rearing these animals, and the scheme would have failed had it not occurred to M. Polonceau that a cross between the Thibet and Angora goat, remarkable for the length and silkiness of its hair, might be an improvement on both. The experiment was tried, and succeeded, and instead of three ounces, several of the mixed race produced thirty ounces of down in one season, and of a superior quality, being of finer and longer staple, while the animals themselves were more hardy and docile.

In 1824 some of the pure Thibet goats were imported from France into England by Mr. Tower, and located at Weald Hall, Essex, but their limited produce militated against the extension of the breed with advantage. In 1831 Mr. Riley, an enterprising proprietor of New South Wales, purchased from M. Polonceau ten females and three males, which he conveyed safely to London, and thence to New South Wales; but with what ultimate results we are not able to state.

To describe the common goat is superfluous, its habits, its boldness, and its activity are well known. It climbs rocks and rugged mountains with great agility, and will stand secure wherever it can manage to get the most limited footing. In Egypt and Syria goats are often taught various feats of dexterity, for the performance of which their natural address and activity peculiarly qualify them, but to execute which, nevertheless, requires considerable practice. Dr. Clarke, in his 'Travels' (vol. ii.), notices an instance of this kind, which he describes as follows:—"Upon our road we met an Arab with a goat, which he led about the country for exhibition,

650.—Common Goat.

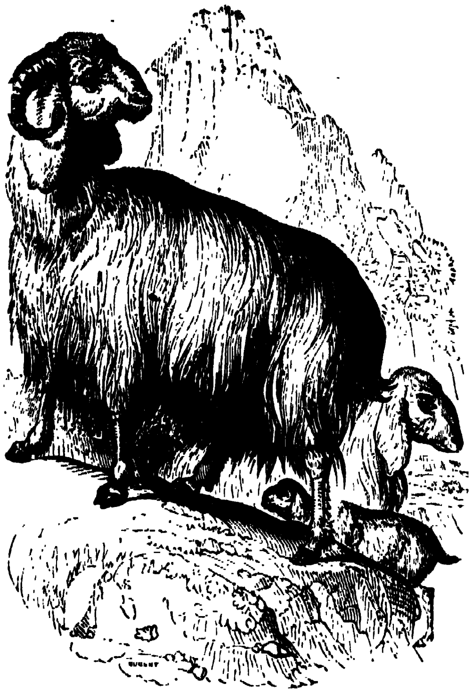
669.—Ibex.

667.—Ibex

665.—Arab and Goat

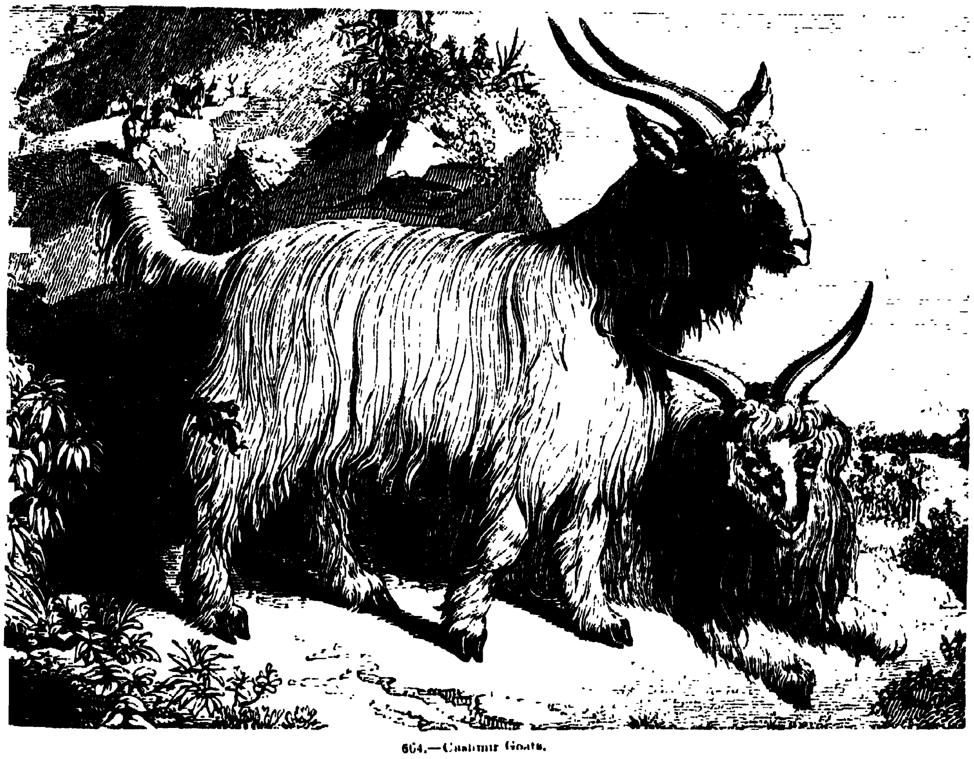
668.—Ibex.

671.—Aoudad, or Kebsch

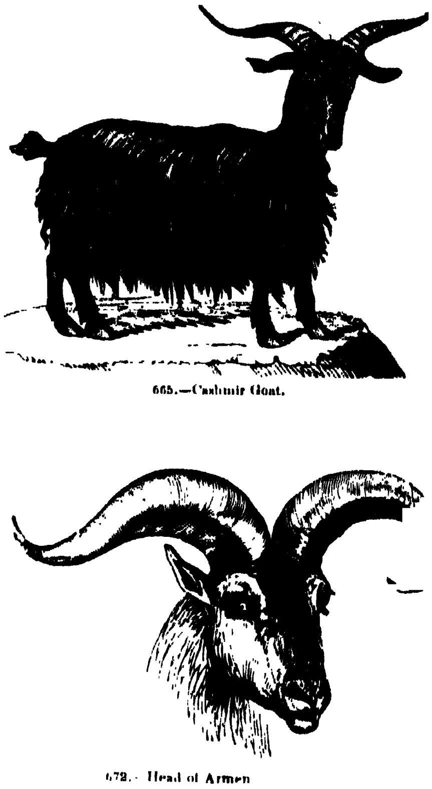


I Syrian Goat.

662.—Long eared Syrian Goats.



664.—Cashmir Goats.



665.—Cashmir Goat.

672.—Head of Armen

[illegible]

in order to gain a livelihood for itself and owner. He had taught this animal, while he accompanied its movements with a song, to mount upon little cylindrical blocks of wood, placed successively one above the other, and in shape resembling the dice-boxes belonging to a backgammon table. In this manner the goat stood, first, upon the top of one cylinder, then upon the top of two, and afterwards of three, four, five, and six, until it remained balanced upon the top of them all, elevated several feet from the ground, and with its four feet collected upon a single point, without throwing down the disjointed fabric upon which it stood. The practice is very ancient. It is also noticed by Sandys. Nothing can show more strikingly the tenacious footing possessed by this quadruped upon the jutty points and crags of rocks, and the circumstance of its ability to remain thus poised may render its appearance less surprising, as it is sometimes seen in the Alps, and in all mountainous countries, with hardly any place for its feet, upon the sides and by the brink of most tremendous precipices The diameter of the upper cylinder, on which its feet ultimately remained until the Arab had ended his ditty, was only two inches, and the length of each cylinder was six inches." Fig 666 represents this performance

The period of gestation with the goat is five months, and the female usually produces two, sometimes three young at a birth.

The use of the goat in England, compared with other countries, is very limited; the demand for its milk is only occasional, and the flesh even of the kid is not in much request Few stable yards, however, are without a goat or two, the peculiar odour of the animal (especially strong in the male) being supposed to be both salutary and grateful to horses While doubting this, we can well imagine that the presence of the active, familiar, and playful goat may *not be unproductive of benefit to the horse confined in his stall, as the latter, like most animals, delights* in society, and instances of attachment between *goats and horses are far from being uncommon*

From the domestic goat we must pass to consider our specimens of some of its wild representatives.

667, 668, 669.—The Ibex, Bouquetin, or Steinbok

(*Capra Ibex*). This bold and powerful animal, armed with huge sweeping horns, inhabits the alpine heights of Europe and Western Asia It associates in small troops, consisting of a male and a few females The horns of the male curve boldly over the back, their anterior surface presenting a series of regular protuberances or partial rings their length is often three feet In the female they are smaller. The hair of the Ibex in summer is short and close, in winter long and thick, its colour is yellowish grey, a black streak extending along the spine, the croup is white, as are also the under parts of the body, a dark tint abruptly dividing the white from the general colour above The chin is bearded The Ibex stands two feet six or eight inches in height, and is extremely active and vigorous. *The chase of the Ibex is as arduous as that* of the chamois, the animal leading its pursuer, unless he can steal upon it unawares with his rifle, a dangerous track over steep and rugged mountain pinnacles, along the brink of precipices, and over fearful chasms: when at last hard pressed the Ibex will often turn upon its foe with impetuous rapidity, and hurl him headlong down the steep rocks or abrupt precipice

The Ibex is vigilant and wary; and it is only during the night that it descends to pasture in the woods, but at sunrise again repairs to the bleak mountain summits Like the chamois it is satisfied with a frugal fare and a scanty supply of water It is said that the old males seek more elevated spots than the females and younger males, which are more easily to be obtained The only sound which the animal makes is a short whistle, and when irritated, a snorting noise In Europe its favourite haunts are the Alps, the Apennines, the Pyrenees, and the mountains of Tyrol In Asia it is found in the mountain-chain of the Taurus.

670.—The Paseng

(*Capra Ægagrus*). The Paseng is found in the mountains which traverse the north of Persia and India as far as China, and especially the Caucasian chain and that of Taurus. It is known to the Turkomans, Kirghiz, and other nomadic people to the north of Persia, and also to the natives of the Persian provinces at the southern base of the mountains. The Paseng exceeds the largest domestic goat in size, and is very strong and active, precisely resembling the Ibex in habits and manners The general colour is grey, shaded with rusty brown: the forehead is blackish brown, whence a line of the same colour extends down the spine, crossed by a similar band over the withers; the beard is long and of a dark brown, which is the colour of the limbs; a white patch occupies the crupper. The horns of the male are very large, compressed, and slightly diverging as they arch backwards; their anterior edge is narrow, and marked by a series of protuberances with deep notches between.

A species of Ibex, distinct, it is believed, from the European, inhabits the Caucasian range, and especially the neighbourhood of the sources of the rivers Terek and Caban. It is the Capra Caucasica of Guldenstet. (Fig 667)

Ruppell, in his 'Zoological Atlas,' describes and figures an ibex from the mountains of Abyssinia, under the native name of Walie (Capra Walie, Rupp). It is of a dark-yellowish umber, the under surface and inside of the limbs being white.

Another distinct species is the Jemlah Ibex, described by Col. H Smith (Capra Jemlaica), with horns peculiarly massive at the base. It is an inhabitant of the range of the Himalaya mountains This species would appear to be the Jhâral of Mr. Hodgson. Its height is thirty-three inches; the head is finely formed, full of beauty and expression, clad in close short hair, and without the least vestige of a beard. The Jhâral is of compact and powerful make, with a spare, short, and bowed neck, deep barrel and chest, longish, very strong and rigid limbs, supported on perpendicular pasterns and high compact hoofs. The fur is of two sorts, an outer coat of straight and somewhat harsh hair, and an inner vest of soft fine wool. The fore-quarters are superb, and wholly invested in a long, flowing, straight, lion-like mane, feathered vertically from the top of the withers and sweeping down below the knees The horns are nine inches long, subtriangular, wrinkled across, and gently recurved The colour is deep brown superficially, but under the outer coat hoary blue, which is the prevailing tint of the mane; chin and lips hoary, with a blackish mark below the angle of the mouth This fine species is found in the Kachar region of Nepal, solitary or in small herds: it is bold, capricious active, and pugnacious, but easily tamed, and breeds, as does the ibex, with the common goat. (See 'Proceeds Zool Soc' 1834 p 106) Mr. Hodgson considers it distinct from the C Jemlaica, and terms it C. Jhâral

An ibex from Nubia and Arabia is described by Fred Cuvier, under the title of Capra Nubiana It is more slightly built than the common ibex, with slender elongated horns two and a half feet in length A specimen is preserved in the museum of the Zool Soc Lond. How far the species of ibex we have noticed are truly distinct from each other, or mere varieties resulting from climate and other causes, we will not attempt to decide It is perhaps the Caucasian ibex that exists in Palestine, Edom, and Sinai, and which is stated closely to resemble the ibex or bouquetin of the Alps It is called in Arabic Beden and Taytal. The former appellation is exclusively applied to the male, which is readily distinguished by a beard and large knotted horns curving backwards over the body The horns of the female are very much smaller, scarcely exceeding in size those of the gazelle.

671.—The Aoudad

(*Capra Tragelaphus; Ovis Tragelaphus* Pallas; *Ammotragus Tragelaphus*, Blyth, in 'Zool Proceeds' 1840, p 78) This species is in some respects intermediate between the goat and sheep with which latter it is associated in most systematic works It differs from the sheep in having a concave chaffron, and in the absence of suborbital sinuses but in the form of its horns it resembles them more than it does the ibex or wild goat. These horns are stout, subquadrangular, and ringed; they diverge more laterally than those of goats in general, and curl as in the sheep There is no beard, but a pendent mane of long coarse hairs begins under the lower jaw, and runs along the under side of the neck and chest. The fore-legs above the knee are also covered with long hair, which hangs round the leg below the knee like a ruffle, whence the French term this species "mouflon à manchettes" The rest of the body is clothed with short hair; the general colour is dull yellowish brown The male attains a large size, exceeding a fallow-deer, and measuring more than three feet at the shoulder. The horns are sometimes two feet in length following the curve. The female is a third smaller than the male.

The Aoudad, as it is called by the Moors of Barbary, is found in Sinai, and in the mountains which border the Nile to Ethiopia and Abyssinia. In Egypt it is termed Kebsch by the modern Arabians. It is also spread throughout the whole of North Africa, about 18°, frequenting in small families the steepest and most inaccessible crags. It is abundant in the range of the Atlas, tenanting the woods at a high elevation, and the precipitous rugged heights usually clothed with forests at their base. The Aoudad is wonderfully agile, and leaps with amazing precision to great distances, from ledge to ledge, and from point to point, over the most elevated ridges. The old ones are not unfrequently shot by the Moors of Tunis, Tripoli, and other places, and the young are occasionally captured alive. It is, however, very rarely seen in European menageries. A female some years existed in the gardens of the Zool. Soc. London, and is the only one we have ever had the opportunity of examining alive. Fine preserved specimens are both in the British Museum and that of the Zool. Soc. This species is clearly delineated on the monuments of ancient Egypt.

Genus Ovis.—Sheep.

Of all our domestic animals, the sheep is that of which we have the earliest notice: "Abel was a keeper of sheep." It was reclaimed in the primordial era of man's existence on the globe, and we must look to western Asia as its original habitat. From this centre it has more or less gradually spread by the agency of man, and, influenced by climate, food, and treatment, has ramified into numerous varieties Naturalists have amused themselves with conjectures as to the wild stock whence the domestic sheep has descended; some asserting the Mouflon of Crete, Corsica, and the islands of the Grecian Archipelago to be its origin; others the Argali of Siberia: others, again, that the European sheep are the descendants of the Mouflon, the Asiatic of the Argali. Mr. Blyth considers it likely "that more than one wild species have commingled to form the numerous domestic races," though, as he adds, certainly none as yet described; and though so many decidedly distinct wild species have been added to the genus, we are far from having ascertained the complete number existing, several more yet remaining to be discovered, upon the lofty table-lands and snowy mountains of Middle Asia, from the Caucasus and Taurus to the Altai, and among them it is probable there may be some much more nearly allied to the domestic races than any at present known He believes that a wild sheep or Argali in central Persia, noticed by Sir John MacNeill, will prove upon further investigation to be the wild stock, or one at least of the wild stocks of the domestic sheep This wild Persian species is at present undescribed When we consider that for several thousand years the domestic sheep has been subject to man, and undergone many modifications, we cannot help doubting as to the recognition of its primitive type, nay, we even doubt whether that type be extant. Hector Boethius describes a wild breed of sheep in the Island of St Kilda exceeding the largest goat in size, with heavy massive horns, longer than those of the ox, and as bulky, and with a tail hanging to the ground Skulls of sheep, perhaps belonging to this race, occur in peat-bogs, two of these crania, one probably that of a male, the other of a female, which were obtained in Ireland from the peat, were some time since exhibited to the Geological Society. Pennant remarks that such an animal as Boethius has described is figured on a bas-relief taken out of the wall of Antoninus near Glasgow. These animals, whether they ever existed or not, were distinct not only from the Mouflon of Corsica, but from any other of the wild species as far as we know them.

In the 'Zool Proceeds' 1840, is a paper by Mr. Blyth, entitled 'An amended list of the genus Ovis, which is too full of information to be altogether passed over We may premise by observing that Fig 672 is a sketch of the head of the Armenian Argali (Ovis Gmelinii Blyth), Figs 673 and 674 are drawings of the Mouflon of Corsica (Ovis Musimon).

The species (granting that they are all distinct from each other) enumerated by Mr Blyth are the following some of which are new to science:—

The Pamir sheep, or Rass (Ovis Polii, Blyth). "In the narrative of the celebrated Venetian traveller Marco Polo, we read that upon the elevated plain of Pamir, eastward of Bokhara, and 16,000 feet above the sea-level, wild animals are met with in great numbers, particularly sheep of a large size, having horns three, four, and even six palms in length. The shepherds form ladles and vessels from them for holding their victuals They also construct fences for enclosing their cattle and securing them against the wolves, and which likewise destroy many of the wild sheep. More recently an animal called the Rasse was indicated, from report, in Sir A. Burnes's 'Travels in Bokhara,' and its horns have been since transmitted to the Royal Asiatic Society, by Lieut Wood, of Sir A. Burnes's party, through the medium of G. T. Vigne, Esq." This pair of horns was labelled Rass or Roosh. Sir A. Burnes writes: "I have heard of an animal called Ross by the Kirghises, and Kooshgar by the natives of the low countries; but Lieut. Wood, in the narrative of his recent journey to the source of the Oxus, distinguishes between the Ross and the Kutchgar, the former having straight spiral horns, and its dun-colour being of a reddish tinge. Both are said to be peculiar to the Pamir. The same writer, speaking of the Kutchgar, says it was a noble animal, standing as high as a two-year old colt, with a venerable beard, and two splendid curling horns, which, with the head, were so heavy as to require considerable exertion to lift them. Though poor in condition, the carcass divested of its offal was a load for a baggage pony. The Kutchgar is gregarious, congregating in herds of several hundreds; they are of a dun colour." This traveller confirms Marco Polo's narrative: "We saw," he writes, "numbers of the horns strewed about in every direction, the spoils of the Kirghise hunter." "The ends of the horns projecting over the snow often indicated the direction of the road, and wherever they were heaped in large quantities, there our escort recognised the site of a Kirghise encampment." The flesh is much prized by these people, who shoot it (the animal) with arrows. "The Rass is said to delight in the coldest districts; a common-sized individual will require two horses to bear its flesh from the field." The horns, following their curvature, are nearly five feet in length. It would appear that the Kutchgar has yet to be added to the list of species.

The Siberian Argali (Ovis Ammon).—This noble sheep is described by Pallas.

The Kamtchatkan Argali (Ovis nivicola).—M Eschscholtz, who describes this species, states it to be very numerous on the mountains of Kamtchatka; in summer it resides upon the snow-clad heights, but in winter it descends to the lower regions. Kotzebue notices its agility.

America presents us with two species very closely allied to the Siberian Argali. The Rocky-Mountain Argali (Ovis Montana), and the Californian Argali (O Californiana, Douglas) *.

The Nahoor, or Snà, of Thibet (Ovis Nahoor, Hodgson), a native of the Kâchâr region of Nepâl and the glaciers of the Himalaya.

The Burrhel (Ovis Burrhel, Blyth), a species allied to the latter, and inhabiting the highest ridges of the Himalayan chain, where it "bounds lightly over the encrusted snows, at an altitude where its human pursuers find it difficult to breathe. It has the bleat of the domestic species, as indeed they all have, and is very shy and difficult of approach. Flocks of ten or twenty have been observed conducted by an old male, which make for the snowy peaks upon alarm, while their leader scrambles up some crag to reconnoitre, and, if shot at, bounds off a few paces and again stops to gaze. They pasture in deep and hollow grassy glens." A specimen, in the Museum of the Zoological Society, was shot near the Boorendo Pass, at an altitude of about 17 000 feet.

The Caucasian Argali (Ovis cylindricornis, Blyth), hitherto confounded with the Siberian Argali.

The Armenian Argali (Ovis Gmelinii, Blyth).—Specimens of this sheep, from Erzeroom, are living in the Gardens of the Zoological Society. "According to Gmelin, this species is found only in the highest mountains in Persia. The males, he informs us, are very quarrelsome amongst each other, insomuch that he had been at one place where the ground had been strewed with horns that had been knocked off in their contests.' It is allied to the Corsican Mouflon. "Sir John MacNeill informed me that 'it appears to be the common species of the mountains of Armenia, occurring likewise on the north-west of Persia,' but the wild sheep of the central parts of Persia is evidently distinct, 'having horns much more resembling those of the domestic ram, being spiral, and completing more than one spiral circle. I think I am not mistaken in supposing,' continues Sir John, 'that I have also had females of this species brought to me by the huntsman with small horns, resembling those of the ewes of some of our domestic sheep, but on reflection I find that I cannot assert this positively, though I retain the general impression.' It is highly probable that a wild type of O Aries is here adverted to, which would thus inhabit the same ranges of mountains as the wild common goat (C Ægagrus); and with respect to the circumstance of horns in the female sex, I may here remark that this character is very apt to be inconstant throughout the present group."

The Shà (Ovis Vignei, Blyth), a Mouflon inhabiting the mountains of Little Thibet and the Sulimani range between India and Khorassan. "Vast numbers of this species are driven down by the snow in winter to the branches of the Indus, where the river breaks through the chain of the Himalaya." The wild sheep of the Hindoo Koosh mountains, described in the 'Journal Asiatic Soc. Beng.' for 1840, is either this or a closely allied species. Its climbing powers are extraordinary.

The Corsican Mouflon (Ovis Musimon, Linn.), a native of Corsica and Sardinia. Speaking of this sheep, Mr. Blyth remarks—"It has always appeared to me, however, that the specifical distinctness of the Mouflon is very obvious, and I doubt whether it has contributed at all to the origin of any tame race. That it interbreeds freely with the latter, under circumstances of restraint, is well known; but we have no information of hybrids, or Umbri, as they are called, being ever raised from wild Mouflons, though the flocks of the latter will occasionally graze in the same pasture with domestic sheep; and all but mingle among them. The male of this animal is denominated in Corsica Mufro, and the female Mufra, from which Buffon, as is well known, formed the word Mouflon; and in Sardinia the male is called Murvoni, and the female Murva, though it is not unusual to hear the peasants style both indiscriminately Mufion, which (as Mr. Smyth remarks, in his description of that island) is a palpable corruption of the Greek Ophion. It is sometimes stated, but I do not know upon what authority, that a few of these animals are still found upon the mountains of Murcia.'

The Cyprian Mouflon, probably different from the preceding, and termed by Mr Blyth O Aphion.

In this review of Mr Blyth's paper we have omitted the Ixalas Probation, Ogilby (of which a unique specimen exists in the museum of the Zool Soc London, the history of which is obscure), and the Aoudad (Ovis Tragelaphus, auct.), which we refer to the goats.

From none of the species here enumerated can we confidently select the type of the domestic sheep (Ovis Aries, Linn.)

The Mouflons and Argalis, that is, the wild species of the genus Ovis, are covered with a harsh kind of hair, having beneath it at its roots a short spiral wool, which in winter becomes longer and fuller. Mr Bell, indeed, considers the harsh hair as essentially wool in its structure, presenting the imbrications which the microscope shows to be the characteristic of wool, and on which its felting property depends; and he regards the short under-coat as composed of hair and not of wool. Mr Youatt makes the contrary statement, and notwithstanding the appearances noticed by Mr Bell, we incline to Mr Youatt's opinion, for, be it observed, in the Cashmir and the Angora goats the long outer garment is hair, the short under-coat exquisitely fine wool. In other wool-bearing animals, as the beaver and otter, the same arrangement prevails; and we know, moreover, that in some neglected breeds of common sheep the wool becomes mixed with long hairs (not short and fine), which more or less obscure the wool.

The causes which have rendered the fleece of the European sheep what we now find it are involved in obscurity. We attribute much, in the first instance, to the effects of temperature; for though the merino sheep of Spain (a race originally imported from England), and the flocks of Australia and Southern Africa, are pre-eminent as wool-bearers, yet it would seem that the predisposition to develop wool at the expense of hair is acquired only in temperate, elevated, or even cold climates. For instance, we learn from Mr Hodgson that the wool of the Bhotean domesticated sheep called Huniah, is superb, and he adds, the animal is suited only to the northern district of Nepâl, suffering much from the heat of the central district ('Zool Proceeds,' for 1834, p 99.) On the other hand, it is clear that in the early ages of man's history, the shepherds must have selected for breeding those individuals on which the wool predominated, and that, by following up this system, the sheep gradually attained its present condition, so that a wool-bearing breed became at length permanently established. Originally, perhaps, the sheep, then a wool-bearer and long domesticated, was of a brown or rusty-black colour, a hue still lingering on the faces and limbs of many of our breeds, and sometimes appearing as the general tint of individuals, thus conspicuous in the midst of their white-fleeced companions. Nine out of ten of the sheep of Dukhun are black, with short, crisp, coarse wool.

As the primitive fleece of the sheep was a mixture of hair and wool, we cannot be surprised to find races domesticated in which the hair predominates over the wool, and that so greatly, that they may with propriety be termed hairy. Sometimes the hair is like that of a spaniel dog, long and silky, and many of the flocks of the Bucharian Tartars are thus clothed. To this breed may be referred the Cretan or Wallachian sheep (Ovis Aries, var Strepsiceros), common in Crete, Wallachia, Hungary, and the western parts of Asia (Fig 675.) Of this variety a splendid ram from Mount Parnassus was presented by Dr Bowring to the Zool Soc Lond. It was vicious, unruly, and of amazing strength. Its horns were very large, and spirally contorted, adding greatly to its striking and picturesque appearance. Its fleece consisted of hair and wool, the former being of great length, perfectly straight, close set, and beautifully fine, falling from the middle of the back on each side of the animal, almost to the ground. On the face the hair was short, and of a rusty black; on the body it was white. In general the horns in the male rise almost perpendicularly from the skull, making a series of spiral turns in their ascent, the first turn being the largest, while in the female they diverge, taking a lateral direction. In the specimen, however, to which we have alluded, they extended laterally from the skull, and after the first turn took a downward sweep; variations in these points may be expected in domesticated animals. In some varieties of the Guinea sheep the hair is coarse and often shaggy. In the specimens of Guinea sheep figured (Fig. 676), the limbs are long, the body gaunt, the ears pendulous, the forehead arched, and two fleshy excrescences hung from the throat. A smaller hair-clad breed extends along the Slave Coast. The Fezzan sheep, of which we have seen examples in England, closely resemble the Guinea sheep, but have a pendulous dewlap instead of the tassels of skin on the throat. They are gaunt, coarse haired, ill-formed animals, with high withers like a buffalo. The males have small horns. In Madagascar the sheep are covered with short hair. In Persia, Tartary, and other parts of the East, there has long existed a singular variety, with a great deposit of fat on the tail and croup, giving an unsightly appearance to the animal; the tail itself is short, and seems buried in the mass on each side; the body is generally white, the head and neck black. Of the variety (Ovis Aries, var Steatopygus) we have seen specimens in the gardens of the Zool Soc Lond. Fig 677 is a portrait of one of these sheep, with a Caracal brought from Persia. The fleece of the sheep consisted of short, coarse wool, mixed with hair.

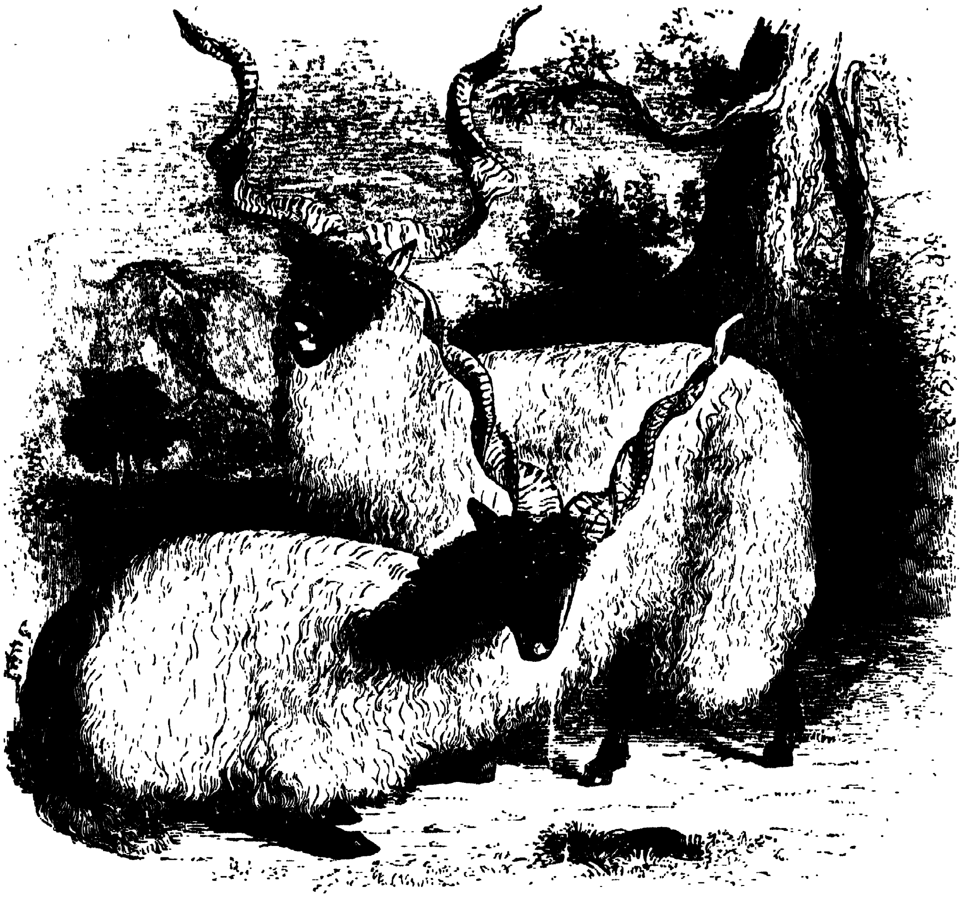
Among other strange varieties of sheep may be here noticed the sheep of Syria and Egypt, with a long tail loaded with fat, which sometimes even trails on the ground. This race (Ovis Aries, var. Macrocercus) is closely allied to the preceding (see Figs 678, 679). In the Egyptian animals the tail is broad throughout, but in the Syrian it narrows to a point. The ordinary weight of the tail is fifteen pounds, but in some of the larger kinds, well fattened, the tail will weigh seventy, eighty, and it is said, even one hundred and fifty pounds. Ludolph saw in Egypt a sheep's tail of eighty pounds' weight. This overgrown tail is a great inconvenience to the animal, and in order to prevent injury to it, the shepherds are often obliged to fix a thin piece of board to the under surface of the part that trails on the ground, to which small wheels are sometimes added. Our figures exhibit the Syrian variety with only a moderate caudal development. The caudal deposit of fat in these varieties of sheep is oleaginous, being of a consistence between fat and marrow, and is often used in the place of butter; when the animal is young, this fat is stated to be little inferior to the best marrow. The long tailed breed (var Macrocercus) is not only found in Arabia, Syria, and Egypt, but is very numerous in the interior and southern parts of Africa, and is covered with a mixture of coarse short wool and hair.

Before we proceed to take a general survey of the more important breeds of our British sheep, we may observe, that besides the variations to which we have alluded, respecting fleece and general form, the horns are subject to great difference of size and curvature, and are sometimes wanting in both sexes, sometimes only in the female; while, on the contrary, in some breeds the number of horns is increased beyond the natural allotment.

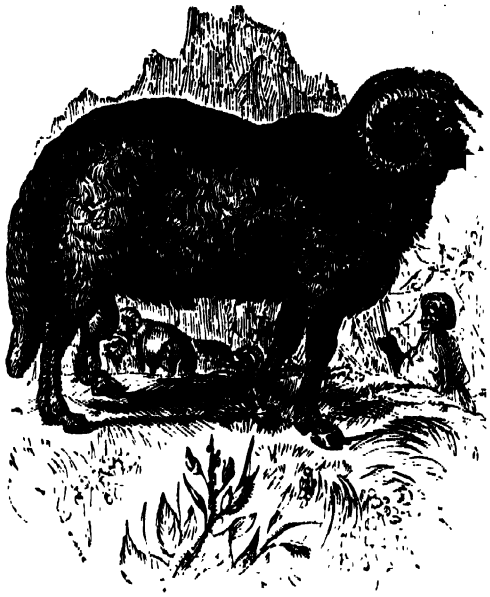
In Iceland and the Feroe Islands there are two races of sheep; one of a small size, and of a dun or rust black colour; the other of larger size, and white. Both these races are remarkable for the number of their horns, varying from three to eight. Four, however, is the usual number, as in the drawing of the head, Fig 680. Of the larger race we have seen many individuals; they are strongly-built animals, with a coarse fleece, consisting of long hair externally, and an under-layer of close wool, impenetrable by the heaviest rain. The wool, however, is of little value, being fit only for horse-cloths and common rugs. These sheep yield an extraordinary quantity of milk, far superior to that of any of the southern breeds. Von Troil in his 'Letters on Iceland,' states that a single ewe will yield from two to six quarts a day. In the Feroe Islands is a wild race of sheep, of great antiquity. They are covered with black, short curled wool, and their flesh has a peculiarly dark appearance and venison-like flavour.

In 1821 Mr Trevelyan visited the Feroe Islands, and found the remnants of this wild race, in no way dependent upon or under the control of man. They are sometimes caught by dogs, but can seldom be obtained, except by being shot, or intercepted in a narrow space and driven over the cliffs.

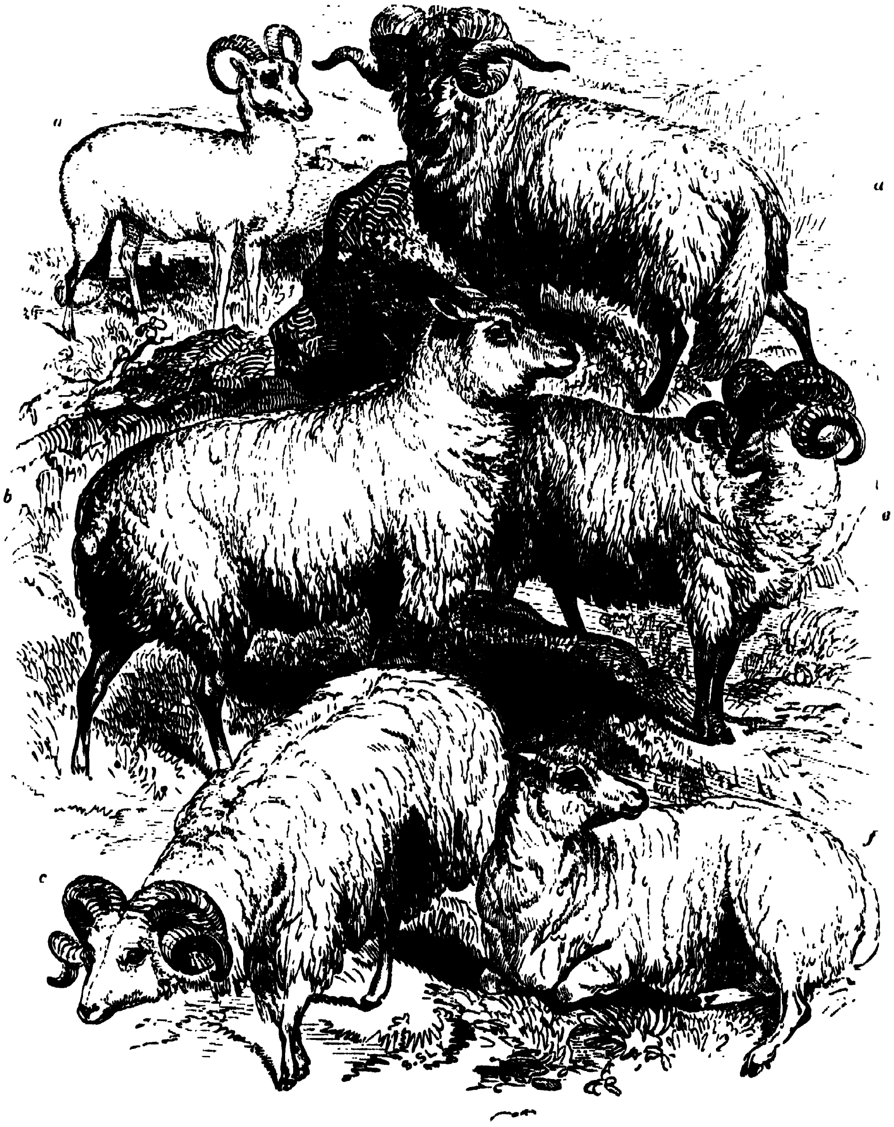
Among the breeds of Europe which have attained to the highest celebrity, and by means of which, through judicious crossing, the sheep of Saxony, Prussia, Austria, and England have been greatly improved as respects the quality of the fleece, is the far famed Merino of Spain (Fig 682). The term 'merino' alludes to the over-sea origin of the race, and there are good grounds for believing that these Spanish sheep are originally of British



675.—Cretan, or Wallachian Sheep



678.—Fat tailed sheep of Syria.

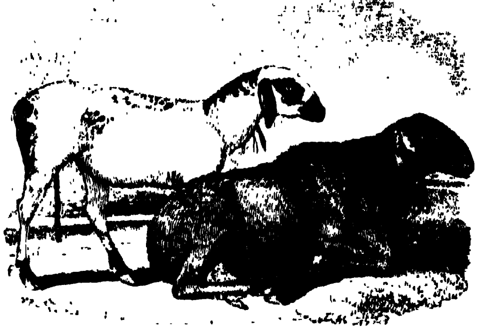


684.—British Middle-woolled Sheep.

679.—Fat-tailed Sheep of Syria.

682.—Merino Sheep, male and female.

681.—Sheep washing.



6[illegible]6.—Guinea Sheep.

687.—[illegible]

685.—British Long-woolled Sheep

extraction, being of the old Ryland or Cotswold stock. Stow and Baker, in their Chronicles, say, "This yere (1464) King Edward IV. gave a licence to pass over certain Cotteswolde sheep into Spain." Baker adds, "King Edward IV. enters into a league with King John of Arragon, to whom he sent a score of Costal ewes and four lambs."

There are other breeds of sheep in Spain besides the Merinos, more or less intermixed with them; but of the pure race it is calculated that there are about ten millions, which, excepting perhaps the flocks of Leon and Estremadura, are migratory, and termed transhumantes, being periodically conducted from one part of the country to another, and back again.

These transhumantes are divided into flocks, which, under the care of a mayoral, or chief shepherd, and assistants, migrate from the mountains of the north to the plains of the south in winter, and return back to the mountains in summer. The flocks follow the shepherds, who lead the way, and direct the length and speed of the journey: a few wethers, perfectly tamed, tread in the footsteps of the conducter, and the rest follow in due order; a powerful breed of dogs accompany the shepherds in order to defend the flock from wolves, and a few mules carry their provision and other necessaries, as well as materials for making up the fold at night.

This migratory system is regulated by a tribunal termed Mesta, which has been of old standing; it can be traced back to the middle of the fourteenth century, at which period definite laws with respect to it were enacted, by which persons were prohibited from travelling along the course of the route pursued by the flocks while the sheep were in motion; it also established a right to graze on all the open and common land that lay in the way; and, moreover, it claimed a path ninety yards wide, through all the enclosed and cultivated country. The journey taken by the Merino flocks is upwards of four hundred miles, which they accomplish in six or seven weeks, and the same time is spent in retracing the route, so that in every year about fourteen weeks (or nearly a quarter) are spent in these toilsome journeys. Popular prejudice in Spain attributes the superiority of the Merino wool to this practice—a practice injurious to the agriculturist, through whose corn-lands and vineyards the flocks pass, and injurious to the keepers of stationary sheep; inasmuch as the common and pasture lands are completely eaten bare by the multitudes that slowly pass over them, while wilfully, or through carelessness, serious damage is done to farms, plantations, fields, and vineyards, for which no redress can be obtained.

It is, however, much to be doubted that the Merino wool owes its superiority, as is asserted by the Spaniards, to this system. The stationary Merinos in Leon and Estremadura produce wool equal in quality to that of the migratory flocks, and these are again exceeded by some of the German Merinos, which never travel; so that at least the advantages of the Mesta system have been overrated, while the evils resulting to the flocks from fatigue, and the injury done to the lands in their course, have been treated with indifference.

In Spain, as in the East, from the earliest times, the shepherd leads his flock. In Italy, in Greece, and some parts of France, it is still the custom; and the reed-pipe of the shepherd may be heard calling the flock together, or the troop seen following him as he leads them to their evening folding-place.

In Greece it is usual, as formerly, to give names to the sheep, which they know and will answer, coming to the shepherd when called. Fig. 683 represents the pleasing spectacle of sheep thus conducted, and on terms of familiarity with their leader, whose voice they obey, though "they know not the voice of strangers."

Reverting from foreign sheep to those of our own island, we may remind the reader that we possess several different breeds, distinguished by different qualities, both as regards form and size, and the characters of the wool. These breeds, or varieties, are the result of skilful treatment, of pasturage, and judicious crossings.

We may divide them into three groups: the short-woolled, the middle-woolled, and the long-woolled breeds.

The short-woolled breed formerly included many varieties, now, from the improvement of their fleece, to be ranked under the second division, as the South-Down, Norfolk, and Cheviot sheep. It is at present, however, represented by the Anglo-Merino race, to which the sheep of New Holland and Van Diemen's Land also belong. The average length of the wool is about two inches and a half, and its texture is peculiarly fine, soft, and even silky. Short wool is used in the manufacture of delicate and beautiful fabrics; it is, however, generally mixed with wool of a longer staple. The Saxony wool, so valued for its fineness, comes under the present division: it is shorter and finer than the Australian wool, but less silky, the serrations of the fibre being more numerous, and disposing it to felt more closely. Hence Saxony wool is the most valuable for the manufacture of fine broad-cloth.

The average weight of the fleece of the Australian short woolled sheep is from three pounds to three and a half; sometimes it amounts to five.

"There is no wool," says Mr. Hughes, "which spins so well as the Australian; large importations are annually sent to the British market, at an average of 2*s.* 6*d.* per pound. In 1833 the quantity imported from New South Wales and Van Diemen's Land amounted to 3,516,869 pounds."

It has been the object of the British wool-grower to convert the short-woolled breeds into a race with wool which, while its length is increased, preserves its original fineness and delicacy. Thus we have now, in place of the old short-woolled breeds, a middle-woolled race of great value, and of which the fleece is in the highest request. Fig. 684 represents several examples of breeds of this race: *a*, the Welsh sheep; *b*, the South-Down sheep; *c*, the Dorset sheep; *d*, the Black-faced Cheviot sheep; *e*, the Norfolk sheep; *f*, the Ryland sheep.

The middle-woolled sheep include the South-Down, the Dorset, the Norfolk, the Suffolk, and the Cheviot breeds, together with several others, and which were formerly short-woolled. The length of the staple is, on the average, three and a half or four inches.

That the improvement of the old short-woolled sheep into a middle-woolled race is an advantage in every sense, especially as the short wool used exclusively in the manufacture of fine cloths is abundantly supplied from foreign "growers" (as the term is), no one can doubt. Of this race, one of the first is the improved South-Down breed depasturing on the long range of chalky hills extending from the sea-coast of the Isle of Thanet, and the cliffs of Dover, through Kent and Sussex. Formerly this breed, as Mr. Ellman states ('Library of Agricultural Knowledge'), was a small size, far from possessing a good shape, and late before they were capable of being fattened; now, however, they are greatly improved both in shape and constitution. "They are smaller in bone, equally hard, with a greater disposition to fatten, and much heavier in carcass when fat. They used seldom to fatten till they were four years old, but it would be a rare sight to see a pen of South-Down wethers at market more than two years old, and many are killed before they reach that age." The South Down sheep is in fact the model of what a hill sheep ought to be, and the flesh in fineness of grain and flavour is peculiarly excellent. The wool is of a very useful quality, but is both larger in fibre and less numerously serrated than the short Saxony, and does not therefore possess such a felting power; hence it is rarely used in the manufacture of fine broad-cloths. Still from its fineness and felting powers, compared with the wool of many other middle-woolled breeds, it is highly esteemed—and for flannels and worsted goods in general is extensively employed. In Surrey, Hampshire, and Berkshire, the South-Downs have either superseded or been blended with the old short-woolled sheep.

Dorsetshire possesses its own breed, encroached upon, however, by the South-Downs. The males have large, spirally-twisted horns, and the females have also horns, but much smaller than those of the male. Neither the wool nor the flesh equals that of the South-Down breed. The old Norfolk breed of middle-woolled sheep is very valuable, but it is rapidly giving way to the South-Down. The rams are distinguished by long spiral horns, those of the ewes and wethers being smaller; the flesh is remarkably fine, and the wool delicate, and felts well. The figure of these sheep is tall and slender; the legs are long, and the face and limbs black or mottled. The general aspect is wild and animated. This breed thrives on the coarsest pasturage. The wool is not used in fine broad-cloths, but is used in such as are of inferior quality, and in woollen stuffs generally.

In Suffolk the South-Down breed prevails. The black-faced and horned sheep of Westmoreland, Cumberland, and various parts of Scotland, as Lanarkshire, belong to the middle-woolled section. With respect to their wool, these sheep do not rank high; it exceeds in length that of the middle-woolled breeds generally, but is harsh and coarse; to compensate for this these sheep are very hardy, have an admirable contour, and the flesh in fineness of grain and delicacy of flavour equals either the South-Down or the Welsh Mutton.

The Cheviot breed is very distinct from the common mountain or black-faced race, with which it is on all sides immediately surrounded, these two races dividing the north between them.

The Cheviot breed is hornless, and the general contour is excellent; the shoulders are full, the body round and long, and the limbs small-boned. The mutton is in great esteem; and the wethers average sixteen, eighteen, or even twenty pounds weight per quarter. It appears from the testimony of practical farmers, that the attention paid to the improvement of this breed, in reference to the condition of the carcass, has been followed by a deterioration in the quality of the wool, which is said to have been formerly capable of entering into the manufacture of fine cloths. Still, however, the wool is good, though inferior to that of the South-Downs. It far surpasses that of the black-faced breed, and as the Cheviot race is equally hardy and as capable of sustaining cold as the former, and is content with the alpine plants of the bleak hills and mountains, it will soon supersede the black-faced breed, as it has already done in the forest of Ettrick and the whole of Selkirkshire, and even Sutherland. The foreknowledge which these sheep possess of approaching storms, and the assiduity with which, while the shepherd dreams of no impending evil, they will seek a place of shelter and security, are curious traits in their history. It is thus that they often warn the shepherd, by the display of this instinct, wisely implanted within them, and lead him to add his precautions to those which they have themselves adopted. In spite, however, of the vigilance of the shepherd and the instinct of the sheep, many often perish, buried beneath towering snow-drifts, and sometimes whole flocks are lost. It often happens that sufficient shelter cannot be obtained, the flock crowd together for the purpose of mutual warmth, and are soon covered beneath the snow. If this does not occur, the lambs, unable to endure the severity of the storm, perish, and the mothers, bewildered, wander about seeking their offspring, till they themselves sink exhausted with their efforts and distress. With but little food sheep can remain for many days buried beneath the snow; but where this cannot be obtained, the period of endurance is proportioned to the strength of the animal's constitution and the intensity of the cold. In the winter of 1800, a sheep near Kendal was buried in the snow for thirty-three days and nights, without the possibility of moving, and yet survived; and a sheep in Cumberland was buried for thirty-eight days. When extricated it was found to have eaten the wool off both its shoulders, and its frame was reduced almost to a skeleton. By due attention, however, it gradually recovered.

Having thus specified some of the more important of the middle-woolled breeds of sheep in our island, most of them, or all, derived from the old short-woolled breeds by a system of judicious management, we shall now take a hasty survey of the long-woolled breeds. (Fig. 685.)

As we have already stated, the middle-wool varies in different breeds, in fineness and in its power of felting. Long wool is much more uniform, and for this reason, that it is the produce of the Leicester race, and of races with which the Leicester race has become completely intermingled. "All long-woolled sheep," says Mr. Youatt, "both in appearance and in fleece, are becoming one family." Long wool, which has lately very much improved, it being the aim of the breeder to render it finer (at the expense of its length, which it will bear), is characterised by strength and transparency, but it is deficient in the power of felting. Its average length is about eight inches. This applies more particularly to that sort called the long-combing wool; there is, however, a variety of long wool which approximates to the middle wool, and termed the short-combing wool, which is somewhat shorter than the other, finer, and more disposed to felt. The long-combing wool is used in the manufacture of hard yarn and for purposes in which length and firmness are essential; the other for stuffs of a softer texture, and for hosiery goods. We hav alluded to the Leicester breed as the typical example of the long-fleeced races, but it is to be observed that this breed is an improvement upon the heavy, ill-made, and coarse-woolled race, formerly spread over all our midland counties. Lincolnshire also had a breed of sheep celebrated for their fine long wool; but this breed, defective in form, and yielding mutton of inferior quality, is now greatly improved, and in fact is blended with the new Leicester sheep.

It is not within our province to follow out the changes which have already taken and are still taking place among the long-woolled breeds of sheep for which our island is expressly celebrated, and in which neither France nor Belgium can at all compete with the English sheep-graziers. To those who wish to gain an acquaintance with this part of the subject, we recommend Mr. Youatt's valuable work on sheep, where they will find much information and abundant reference to various writers on agricultural topics.

There is, however, one question which suggests itself, and which we cannot omit to notice. As far as records serve us, it would seem that a long-woolled and a short-woolled (now middle-woolled) race of sheep have tenanted our island from the earliest times. Now, to what are we to attribute this original difference? Are the two races descended from different primitive sources, or have food and soil gradually produced the differences which have been so long maintained? No one, we think, will hesitate to say the latter, impossible as it may be to follow step by step the progress of the change, or to determine the *modus operandi* of the causes contributing to effect it. It is, however, very remarkable that it is only in animals which have been so long domesticated that we cannot tell their primeval origin, and which there is reason to think are factitious beings (that is the produce of different but still closely-allied species commingling together), that these extreme variations as to size, figure, and length and quality of fur are most decidedly observable. We see these varieties in the dog—from the silky long-haired spaniel of Spanish race to the close-haired old setter of the same country, from the woolly French poodle to the mâtin, from the rough English water dog to the mastiff: so in the sheep we find a short fleeced breed, with the filaments of the wool peculiarly fine and numerously serrated; a still longer fleeced breed, again subdivided into many minor varieties and having the wool fine, and more or less capable of felting, or, in other words, more or less numerously serrated, and a long woolled race of old standing, in which the wool, but thinly serrated, is inferior in felting properties, but of great value to the woolcomber. But further, as the mixture of a long and silky haired breed of dogs with one of close hair does not improve the coat, the young resembling some the male, some the female but not equalling them in their excellences, so the crossing of long-woolled and short-woolled sheep leads to no good results: and, as with dogs, the improvement of each breed depends on a judicious and careful selection of the best and purest of that breed by which the properties distinguishing it may be developed to their maximum in their progeny.

In England the sheep is now only valuable for the sake of its wool and flesh, but in various parts of both Europe and Asia the milk of the ewe has been used from the earliest times, either pure or curdled, as an article of diet. Formerly, in many parts of England cheese was made from the milk of the ewe, and the ewes to the injury of the lambs were milked regularly as described in the 'Odyssey,' and, at a later era, by Virgil:—

> "He next betakes him to his evening cares,
> And sitting down to milk his ewes prepares;
> Of half their udders eases first the dams,
> Then to the mothers' teats submits the lambs.
> Half the white stream to hardening cheese he press'd,
> And high in wicker baskets heap'd: the rest
> Reserved in bowls supplied the nightly feast."
> Pope, *Odyss.* ix.

To the process of shearing we need scarcely allude, all are familiar with the manner in which the removal of the fleece is effected, and it would seem that in the earliest patriarchal ages the same process was in use. Among the Romans, however (and the practice has been but lately discontinued in the Orkney Islands and is, perhaps, still prevalent in Iceland), the wool was torn off the animals, and, as Pliny states, they were kept for three days previously without food in order that the wool might be the more easily detached, their bodies being exhausted. In his time, however, the practice of shearing had begun to supersede this cruel and unjustifiable method. It gave however origin to the word *vellus* (fleece), from *vello* (to pull away), and the hill termed Velleia was the ancient spot on which this cruelty was perpetrated.

With us the season of sheep-shearing is a season of rejoicing, and the manner in which the important work is conducted, and the dexterity of the shearers, are, to those not accustomed to rural life, replete with interest and amusement. It is indeed, a pleasing spectacle to see a large flock of snow white sheep collected together, and in turn losing their soft fleece, rolled into an unbroken and well-arranged whole, beneath the shears of the shearer: the picture is full of poetry, and he must be destitute alike of taste and patriotism that can look coldly upon it. Our sketch (Fig. 681) is a spirited representation of sheep washing for the purpose of cleansing the fleece preparatory to shearing.

To enter into a disquisition on the commercial importance of the sheep, its connexion with national prosperity and international relationships, is not our place. We leave this to the political economist.

Before we close, let us again revert to our starting-point—the question as to the origin of the domestic sheep. It is clear that we cannot identify it with any wild species with which we are yet acquainted. If such exists, it is most probably to be found on the mountains of Armenia—but this is problematical; and there is some ground for supposing that, though the sheep of every region intermingle with each other, they have descended from different primitive origins. The subject is full of obscurity. It is, indeed, strange that while history teems with the accounts of battles, massacres, invasions, the reigns and the crimes of kings, it throws no light upon the domestic animals which man has reclaimed. The motives which led man to attempt this important work, the manner in which he accomplished it, the characters and native abodes of the species selected, are buried in silence. The subject was too mean for history—the actors too humble to be noticed; but thus it ever is, that the glare of mighty deeds effaces the record of the useful, the beneficent, and the truly great.

Genus Bos, Oxen.—Horns in both sexes. Neither suborbital sinus, interdigital fossæ nor inguinal pores. Teats in females four. The animals of this genus are, with some few exceptions, the largest and most massive of the hollow horned Ruminants; their limbs are low and strong, their body heavy, with wide haunches and thick and often elevated shoulders; the head is large and furnished with horns common to both sexes, their progressive increase being marked by annuli at the base. They sheathe a hollow or cancellous bony core, continued from the sides of a bold frontal ridge. The forehead or chaffron is expanded; the muzzle, except in the subgenus Ovibos, is broad, naked and moist; the neck is thick, deep, compressed laterally, carried horizontally, and furnished with a pendent dewlap. The spinous processes of the anterior dorsal vertebræ at the withers are very long and stout. Fig. 686 represents the Dentition of the Ox in two views of the upper and under jaw; Fig. 687 is a very characteristic delineation of the Skeleton of the English short horned Cow, and Fig. 688 is a representative of the osseous structure of the Fore foot (*a*) and of the Hind foot (*b*) of the Ox. All the Ox group are gregarious in their habits and no quarter of the globe is destitute of its indigenous species existing in a state of freedom, tenanting the deep glades of the forest, or roaming over hills or plains.

[illegible]
[illegible]

The Genus Bos may be subdivided into the following minor groups or subgenera: Bos, Anoa, Bubalus, Bison and Ovibos. Of each of these minor sections our pictorial museum contains most interesting examples.

The Ox (Bos Taurus) is now only known as a domesticated animal spread far and wide through almost every region of the globe, contributing by its services and products to the well being of man. Although referred to as a domestic animal in the earliest ages by the author of the Mosaic record, impenetrable darkness hangs over its primeval history, nor know we what is its wild origin, nor whether that origin is in existence.

Temperature, soil, food, a thousand circumstances operating through the revolutions of years, have combined to effect a series of modifications in the ox; every country possesses its peculiar races, and these races by their intermixture, are perpetually producing others, so that it is impossible to say to what extent these changes may be carried, and how far the original type has become already modified. Certain it is that we are acquainted with no animal in a state of original independence to which we can refer as the primitive type of the ox. It is true, however, that within the period of authentic history certain wild oxen existed in Europe. But it is not to Europe that we must look as the cradle of the domestic ox, nor indeed are the accounts left us of these oxen reconcilable with any of them being specifically identical with our domestic race, which indeed, when we look at the Zebu breeds, seems to claim more than one source. One of these wild animals was termed by the ancients Urus (latis cornibus), and another Bison (jubatus or villosus); we have also an animal described under the name of Bonasus (Βόνασος or Βόλινθος, Aristotle). A few observations on these animals may not be uninteresting. The Urus which existed in the Hercynian forest is thus described by Cæsar: "These uri are little inferior to elephants in size, but are bulls in their nature, colour and figure. Great is their strength, and great their swiftness; nor do they spare man or beast when they have caught sight of them. These, when trapped in pitfalls, the hunters unsparingly kill. The youths exercising themselves by this sort of hunting are hardened by the toil, and those among them who have killed most, bringing with them the horns as testimonials, acquire great praise. But these uri cannot be habituated to man, or made tractable, not even when young. The great size of the horns, as well as the form and quality of them, differs much from the horns of our oxen. These, when carefully selected, they ring round the edge with silver, and use them for drinking at their ample feasts." Perhaps the wild bulls with horns of extraordinary size which Herodotus assures us inhabited Macedonia, as well as did the lion, were uri.

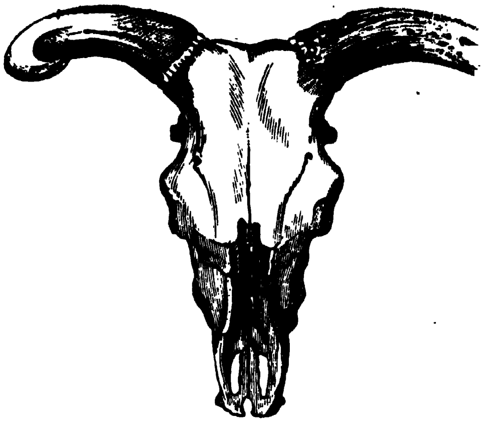
The Bison jubatus of Pliny.—This species, regarded by Cuvier and most naturalists as identical with the Bonasus of Aristotle, is considered, and perhaps with reason, as referable to the Aurochs or Zubr (Bos urus of modern naturalists, not Urus of Cæsar) still existing in the wild forests of Lithuania. In Europe and Siberia the fossil crania of an aurochs are not uncommon, and these skulls, though they scarcely differ in anything from the Lithuanian animal, Cuvier inclines to believe may be of a different, though closely allied species. He gives the figures of a skull in the Paris museum, here copied (Fig. 689, front view; Fig. 690, lateral view) so like, as he observes, to the living aurochs, that the most practised eye can scarcely distinguish it, and also so fresh, that he is in doubt whether it be really a fossil relic, or on the contrary, recent, owing its fossil appearance to having been much weathered. Mr. Lyell states that the bones of the aurochs (or bison) have been found in the North Cliff in the county of York, in a lacustrine formation in which all the land and fresh water shells, thirteen in number, can be identified with species and varieties now existing in that county. To return to the urus of Cæsar and the ancients. We have stated this animal to be characterized by the immensity of its horns and its vast stature, in which former particular it differs materially from the ancient full maned bison or Lithuanian aurochs. This urus no longer, as it would appear, exists, but fossil skulls of a species far exceeding the largest domestic ox in magnitude, with the core of massive horns, are abundant in the superficial strata of Europe. This species is termed by Cuvier Bos primigenius, and he carefully distinguishes the skull from that of the fossil aurochs. In a specimen found at Melksham and described by Mr. Woods, the cores of the horns measured at their widest expansion upwards of four feet; we may easily conceive what must have been the expansion of the horns themselves: the skull, destitute of the lower jaw and not perfect otherwise, weighed sixty-three pounds. Larger specimens however, have been discovered. Fig. 691 represents a front view of the skull of Bos primigenius; Fig. 692, a palatal view; Fig. 693, a back view; Fig. 694, a profile.

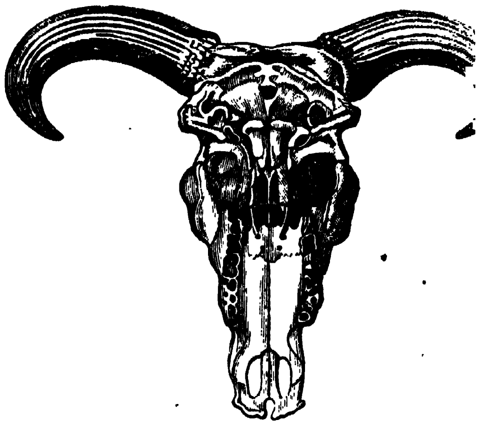
This extinct species Cuvier regards as the type of the domestic ox, in which opinion Mr. Bell and most naturalists coincide, at the same time that they consider the celebrated white wild oxen of Craven, of Chillingham Park and Scotland, as specifically the same with the common ox: on the contrary Col. Hamilton Smith and Mr. Swainson regard the white ox of Chillingham Park (Bos Scoticus of some authors) as distinct from the common ox. The former regards the Chillingham ox as a white variety of the fossil species Bos primigenius, while Mr. Swainson believes it to be the descendant of a smaller species belonging to the same genus as the Bos primigenius or ancient urus, of which "the skulls exhibit the type of a form essentially different from that of the domestic ox.

"All these skulls," he continues, "are nearly one third larger than those of the Bos Taurus; they are square from the orbits to the occipital crest, and somewhat hollow at the forehead. The horns, placed at the sides of the above crest, show a peculiar rise from their roots upwards, then bending outwards, and then forwards and inwards. No domestic races show this turn: but numerous specimens of inferior sizes, found fossil in the Cornish mines, have this shape, and the wild bull of Scotland, the only example of this type now known to exist, retains it. The domestic oxen, on the contrary, of whatsoever country or breed they may be, have the square concave forehead with the horns rising from the ends of the frontal ridge." It appears then that the ancient urus or wild bull, was a perfectly wild, savage and untameable animal: not only does every account handed down from remote antiquity assure us of this, but it is even verified by the only living example of this form we possess, the Bos Scoticus, still preserved in one or two of the northern parks. Although domesticated so far as to live within such precincts without absolute unprovoked violence to its keepers, it retains essentially all the savage characters ascribed to the more powerful species mentioned by the ancients.

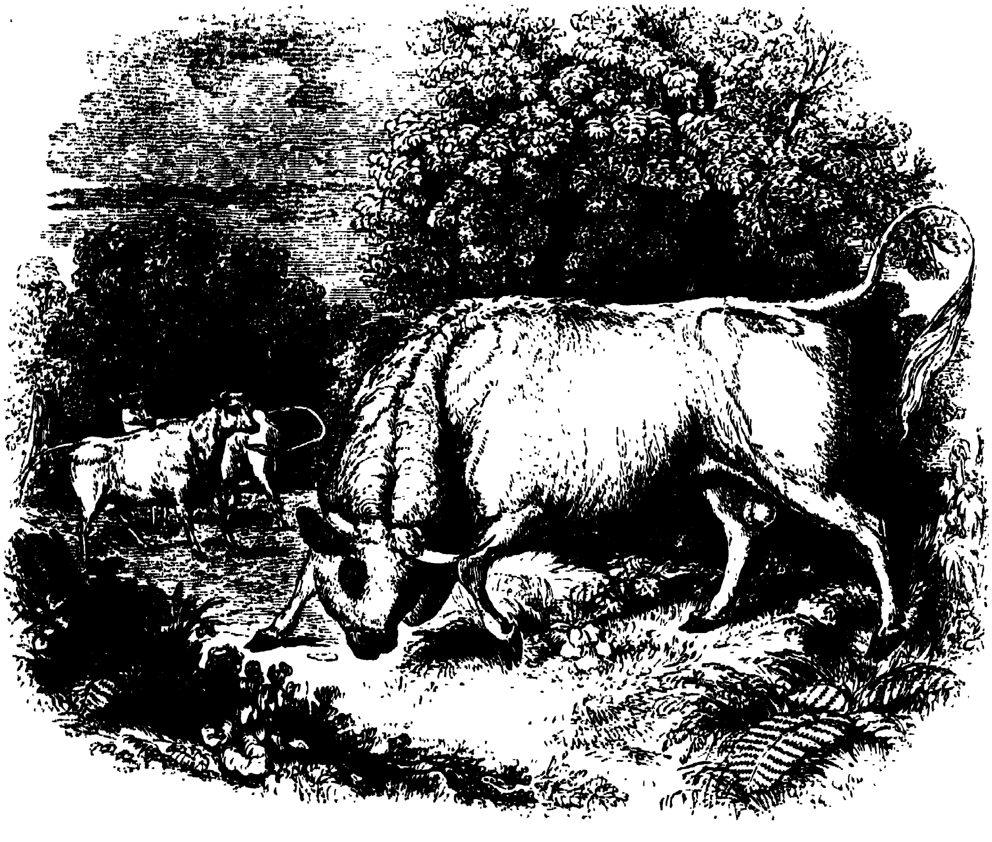
Now as to the specific identity of the white oxen of Chillingham with our ordinary breed, we have no doubt on the subject: in size, form and aspect they resemble the finer breeds of black cattle, and the query is, not—Are they distinct? but—Are they the descendants of a wild breed? or, on the contrary, the descendants of domesticated individuals, which have resumed their wild character, "from having ceased to feel through many generations the effects of human domination?" We suspect the latter. With regard to Cuvier's Bos primigenius, granting it to be the urus of Cæsar, we are not quite so sure that it was the wild type of the domestic ox. Its vast size, and the extraordinary magnitude of the horns, to say nothing of its ferocity, and the probability that it is to Central Asia, rather than to the

696.—Chillingham Bull.

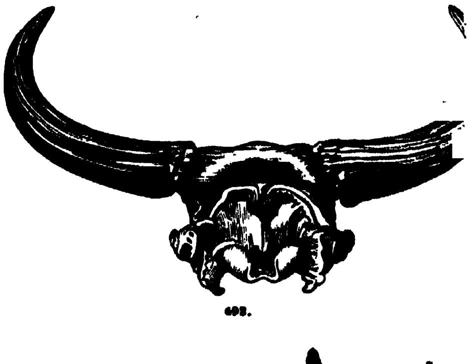




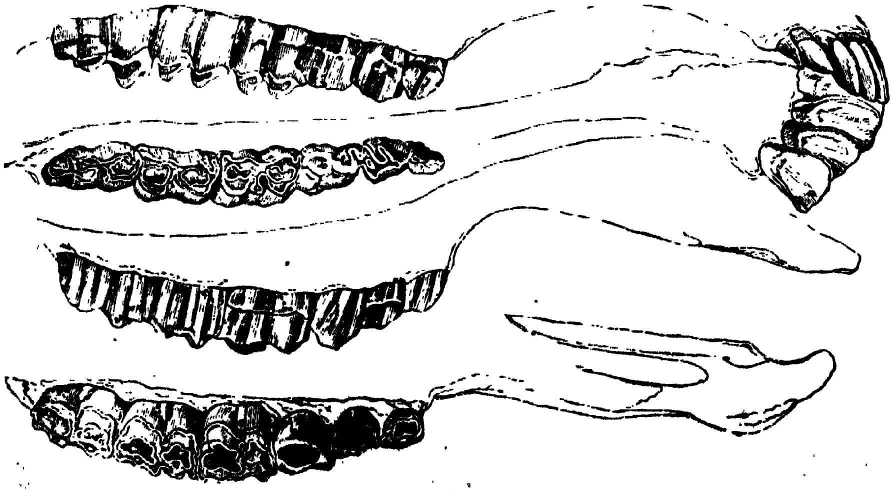
692.



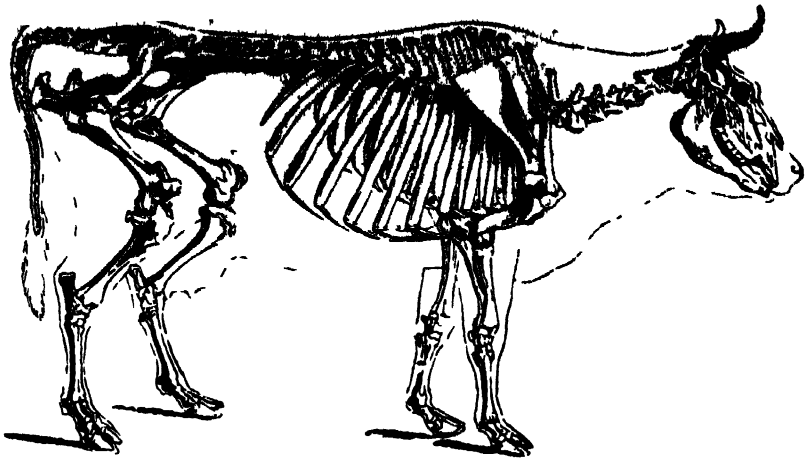
ngham Park.



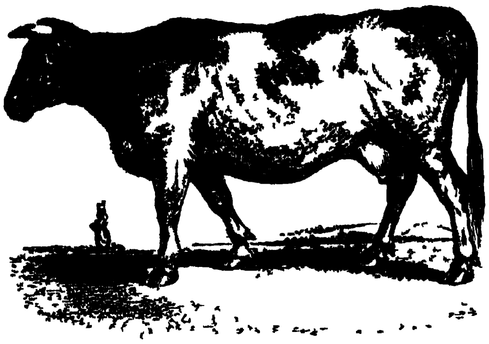
693.



[illegible]

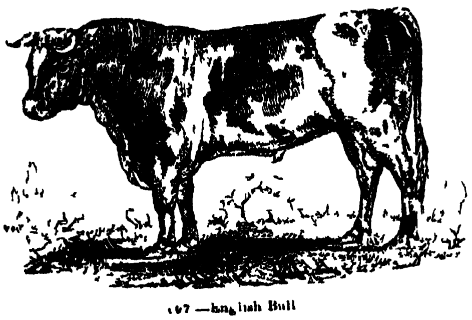


687.—Skeleton of Cow.

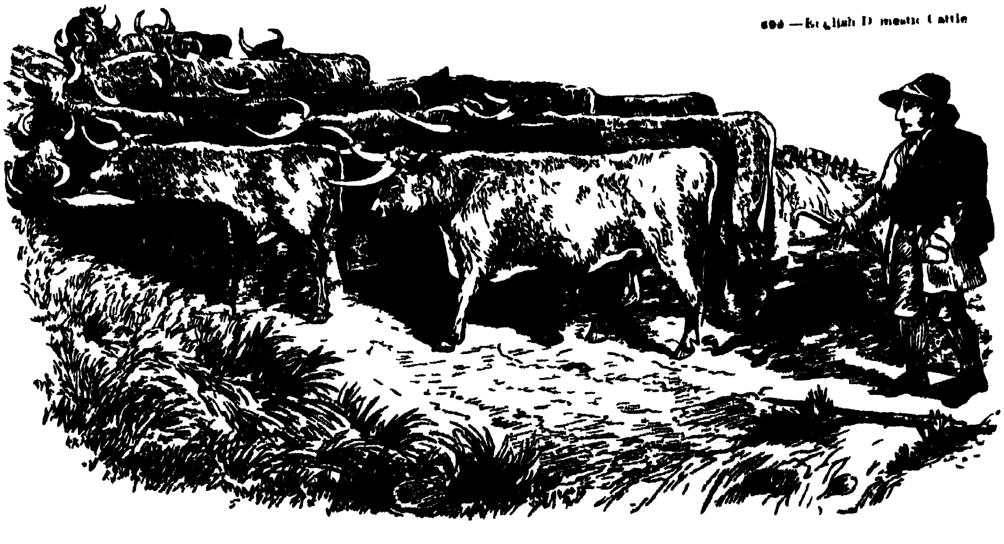


696.—Yorkshire Cow

698.—English Domestic Cattle



697.—English Bull



wild forests of Central Europe, that we ought to look for the type of the domestic race (or races?), are sufficient to induce a doubt.

The term urus is evidently identical with the terms auer, ur, auerochs, ure-ox, the root also of the word taurus; and we agree with Mr. Woods in the belief that the aurochs, or ure-ox, of the ancient Germans, was the urus of Cæsar, but that the word, on the extinction of that animal, became transferred to the bison of the ancients, now known as the aurochs, and also under names derived from a different root, as zubr (Lithuanian), zimbr (Moldavian), bison, vison, wisont, and wisant, whence bonasus, monasus, &c.

Besides the Bos primigenius, the following fossil species of ox have been named – Bos trochocerus (Hermann von Meyer), subapennine beds. Bos (Bison) priscus (Bonjanus), Buffle fossile de Siberie (Cuv.). Bos latifrons (Harlan), Broad-headed fossil Bison and Bison fossilis, 'diluvium' of Europe and North America, bone-caves and bone breccias; Bos (Bison?) bombifrons (Harlan), Big bone-lick, North America. Bos Pallasii (Dekay), Bos moschatus fossilis? Bos canaliculatus (Fischer)? Siberia and North America; Bos velaunus (Robert), Cussac, Haute Loire.

Abundant remains of the ox were found by Capt. Cautley in the Sewalik Mountains, at the southern foot of the Himalayas, between the Sutlej and the Ganges, partly lying on the slopes among the ruins of fallen cliffs, and partly *in situ* in the sandstone, in company with the bones of mastodon, elephant, rhinoceros, hippopotamus, hog, horse (comparatively scarce), elk, deer, several varieties, carnivora, canine and feline (comparatively scarce), crocodile, gavial, emys, trionyx, and fishes. There were also portions of undescribed mammalia.

695, 696.—THE WILD WHITE CATTLE OF CHILLINGHAM PARK

(*Bos Taurus*, var. *Scoticus*). Having thus introduced this beautiful breed of cattle to our readers' notice, we shall proceed to a few interesting details respecting its history.

Mr Youatt, in his admirable work on cattle ('Library of Useful Knowledge'), clearly expresses his belief in the identity of the wild breed with our domestic races, and adds that the slightest observation will convince us that the cattle in Devon, Sussex, Wales, and Scotland are essentially the same breed changed by soil and climate, yet little changed by the intermeddling of man "Every one who has had opportunities of comparing the Devon cattle with the wild breed of Châtelherault Park, or Chillingham Castle, has been struck with the great resemblance in many points, notwithstanding the difference in colour" In another place the same writer says: "To the Principality we naturally look for some trace of the native breed of cattle, for the Welsh were never entirely subdued by any of the early invaders. The Romans possessed merely a portion of the country, the Saxons scarcely penetrated into Wales, or not beyond the county of Monmouth. The Welsh long resisted the superior power of the English under the Norman kings, and it was not till late in the thirteenth century that the Principality was annexed to the crown of England. We therefore expect to find more decided specimens of the native productions of our own island, nor are we altogether disappointed Howell Dha, or Howell the Good, describes some of the cattle in the tenth century as being white with red ears, resembling the wild cattle of Chillingham Castle An early record speaks of a hundred white cows with red ears being demanded as a compensation for certain offences against the princes both of North and South Wales. If the cattle were of a dark or black colour, a hundred and fifty were to be presented. When the Cambrian princes did homage to the king of England, the same number of cattle, and of the same description, were rendered in acknowledgment of sovereignty. Speed tells us that Maud de Broos, in order to appease King John, whom her husband had offended, sent to his queen a present from Brecknockshire of four hundred cows and a bull, all white with red ears. Whether this was the usual colour of the ancient breed of Welsh and British cattle, or a rare variety esteemed on account of its beauty, and chiefly preserved in the parks of the nobles, we are unable to determine. The latter is the most probable supposition; and the same records that describe the white cattle with red ears, speak also of the dark or black coloured breed which now exists, and which is general throughout the Principality." As a further point in favour of the probability of the white wild cattle being specifically the same as our domestic races, we select the following quotation from the work above referred to: "The colours of the improved short-horns are red or white, or a mixture of the two, combining in endless variety, and producing very frequently a most brilliant effect. The white, it is very probable, they obtained from an early cross with the wild breed, and whenever this colour shows itself it is accompanied more or less with a red tinge on the extremity of the ear, a distinctive character also of the wild cattle."

Are then the wild cattle of Châtelherault Park, Lanarkshire, or Chillingham Park, Lime Hall, Cheshire, and other places, the descendants, as Mr. Youatt seems to infer, of these white cattle of ancient race, so valued in early times, or are they descendants of the wild breed which at an early period tenanted the great forests of our island, and which, as the forests became cleared and the land cultivated, were gradually thinned, till at length their remnant found in the chase or park of the nobleman that safety which as old denizens of the soil they might well claim, and but for which the breed would long since have been utterly extirpated? Again, was the wild breed which roamed the Caledonian forest, and the great forest north of London, so late as the latter part of the twelfth century, and mentioned by Fitzstephen, identical with the white Cambrian breed? These are questions more easily asked than solved. One thing is certain—the wild cattle of Chillingham will breed with the domestic race, but the progeny has never been preserved, the calves having been always killed at an early age, from a pardonable desire to keep this ancient race in all its purity; we firmly believe, however, that the cross-breed would be as fertile as any of our domestic varieties.

The author of the article Bos in the 'British Cyclopædia' is of opinion that the white cattle in question are domesticated oxen which have run wild, and, moreover, that they are not descended from an aboriginal stock, but that the race was originally imported by the ecclesiastics from Italy, where herds of wild cattle much resembling them still exist. In this, as in all other theories, authenticated facts as our basis are wanting.

The Chillingham wild cattle are invariably of a creamy white colour with a black muzzle, the whole of the inside of the ears, and the tip externally, are red; the horns are white, with black tips, very fine and bent upwards. Some of the bulls have a thin upright mane, an inch and a half or two inches long. The weight of the oxen is from 35 to 45 stone the four quarters (14 lbs to the stone), that of the cows, from 25 to 35 stone. The beef is finely marbled and of excellent flavour.

These cattle are fleet and active: "At the first appearance of any person they set off in full gallop, and at the distance of about two hundred yards make a wheel round and come boldly up again, tossing their heads in a menacing manner; on a sudden they make a full stop at the distance of forty or fifty yards, looking wildly at the object of their surprise, but upon the least motion being made they all again turn round and fly off with equal speed, but not to the same distance, forming a shorter circle, and, again returning with a bolder and more threatening aspect than before, they approach much nearer, probably within thirty yards, when they again make another stand, and then fly off this they do several times, shortening their distance and advancing nearer and nearer till they come within such a short distance that most people think it proper to leave them, not choosing to provoke them further."

The females hide their calves for a week or ten days after birth in some sequestered situation, and visit them two or three times a day. If any person approach the calves, they crouch close, like a hare in form, and endeavour to hide themselves, but when roused exhibit great fury, pawing, bellowing, and butting at the intruder; the females are resolute in the defence of their young, and attack persons discovered near their lair with impetuous ferocity. Formerly the hunting of these animals was conducted with great parade, many scores assembling on horseback, and hundreds on foot, to witness the sport; but from the number of accidents that happened, and perhaps from the disturbance created among the game, this practice has been long discontinued. The keeper now uses a rifle, and steals upon the animal selected, until within range, and drops it at a single shot.

697 to 702.—ENGLISH DOMESTIC CATTLE

(*Bos Taurus*). To describe the form, contour, and colour of the domestic ox is superfluous; and all know that within the precincts of our fertile island, affording unequalled pasturage, the animal has ramified into many breeds, which it has been the care of the farmer to improve and modify to his own advantage. Excepting in a few districts, the ox is not employed in our country as a beast of draught, or for the labour of the plough, which it was in ancient times on the Continent, and still is in many countries; on the contrary, it is for its flesh on the one hand, and its milk on the other, that this animal is so valuable; indeed, everywhere the true importance of the ox is in itself and not its labour, though in many parts of the world it is used both as a beast of burden and draught. Restricting our present observations to British cattle, we may observe that there are two parties immediately, and we may say professionally, interested in the culture of cattle—the grazier and the dairy-farmer; and both require different and, to a certain degree, incompatible excellences. With the grazier, roundness of form, a moderate smallness of bone, depth of chest, and an aptitude to acquire external fat upon a small consumption of food, are among the points of excellence aimed at and expected. On the contrary, the supply of a large quantity of rich milk is the desideratum of the dairy-farmer; and it very seldom happens that the qualities prized by the one party are combined with those required by the other: both therefore attend to their exclusive interests, agreeing only in the care bestowed upon the animals subservient to their respective purposes. To note every variety and enter into minutiæ—the part rather of the farmer than the naturalist—is far from being our object; a sketch, however, of some of the principal breeds will not be uninteresting as an accompaniment to the pictorial specimens before us.

Among the older breeds was a long-horned race, now greatly modified, of which Lancashire and the West Riding of Yorkshire might be considered as the central district; whence it extended, not to the exclusion of other races, through the midland counties, and even into Ireland. This breed was termed the Craven, from a district of that name in Yorkshire, bordering upon Lancashire, where it is said to have originally appeared. This breed was large, coarse-boned, and apt to be long in the body, which besides was destitute of roundness. The milk, if not abundant in quantity, was extremely rich, and suited the purpose of the dairy-farmer. The horns were of enormous length; sometimes they projected horizontally on each side of the head; generally, however, they swept downwards, with an inward flexure, often reaching below the level of the muzzle, or even meeting before it, so as to interfere with the facility of grazing: we have indeed often seen the points press against the sides of the muzzle, rendering it necessary to shorten them. In the beginning of the eighteenth century various agriculturists commenced a series of attempts towards the improvement of this old breed, which resulted in the establishment of the Dishley or new Leicester longhorn. To the grazier the improvement was most immediately beneficial, but the dairyman preferred the old stock. In process of time, however, the new breed extended, improving the cattle of the middle and northern counties, and especially of Ireland.

In its turn, however, this breed has almost everywhere yielded to a middle or short-horned race, and even in Leicestershire, the stronghold of the Dishley breed, few are now to be seen In Cheshire also—which till recently retained a long-horned breed derived chiefly from the old Lancashire and new Dishley stocks the Durham or short-horned race has made decided inroads, but with doubtful advantage as respects the quality of the cheese for which that county is celebrated.

Among the long-horned race must be reckoned the old Shropshire breed, a large-boned and hardy race, well fitted to serve the dairy. It would appear that this breed is seldom to be seen pure, having been crossed with advantage by the short-horned Holderness. In Staffordshire the old long-horned breed has been in most parts superseded by short-horned cattle, it still, however, maintains its ground in the north of that county, more particularly along the banks of the Trent, and the Dove, close to the borders of Derbyshire. Between the long-horned and the short-horned races of our cattle intervenes a race termed "middle-horns," represented by the North Devonshire, Somersetshire, Herefordshire, Gloucestershire, and Sussex cattle.

The Devonshire breed is of great antiquity, and has been long celebrated for beauty; like most of our other breeds it has become improved during the last 50 or 60 years, and has perhaps now attained to its perfection. The head of the Devon ox is small, but broad across the forehead and narrow at the muzzle; the horns curve gracefully upwards, the chest is deep, and the back straight. The cow is small compared with the bull.

The system of ploughing with oxen is very generally practised in Devonshire, and where the land is not too heavy, no teams of oxen are superior, if equal, to these in this kind of work. It is, however, to the grazier that this breed is more especially valuable, few oxen rivalling the Devonshire in disposition to fatten and in the quality of the flesh. Generally speaking, this breed is inferior to many others for the dairy, not indeed as respects the quality of the milk—for it yields a more than average proportion of cream and butter—but the quantity. Some farmers, however, have found the North Devons to yield even a large produce of milk, so that in this particular much may depend on choice of pasturage.

In Somersetshire the Devon breed prevails, or at least the original breed has been greatly crossed by the Devon, of which it presents most of the excellences. The Somersetshire cattle are alike valuable for "the pail, the plough, and grazing." The tract of country between Bridgewater and Cross produces cheese of well-known excellence; the best Cheddar cheese is made either in that tract or the marshes round Glastonbury.

The Hereford improved breed, with white faces, is valuable as fattening rapidly, and that on inferior fare; the flesh is fine-grained, and highly prized in the market. The cows, however, yield but a scanty portion of milk. In Gloucestershire the Herefords are preferred for the team, and by graziers for fattening; but the old Gloucester breed for milk. This old breed is of mixed origin, consisting of a race of Welsh descent, as is supposed, crossed by various others, and among them the Alderney. The rich Vale of Berkeley produces the finest Gloucester cheese.

The breed of cattle in Sussex closely resembles that of Devonshire: according to judges it is intermediate between the Devon and Hereford, "having the activity of the first, the strength of the second, and the propensity to fatten and the beautiful fine-grained flesh of both." Its colour is deep chestnut red, or blood-bay, and a deviation from these colours indicates a cross. In the Weald of Sussex oxen of this valuable stock are generally used for team-work; and so great is their strength and quickness, that many teams have been known to travel with heavy loads fifteen miles a-day, for several successive weeks and that without distress. The Sussex cow, as is the case with the Devon and Hereford, is very inferior in size to the bull, and though the milk yielded is good, it is of trifling quantity.

A valuable breed of middle-horned cattle extends through South Wales, and of this the Glamorganshire variety is highly celebrated. The oxen are readily fattened, and the cows yield a fair quantity of milk.

Fig. 699 presents specimens of the following breeds:—*a*, the old Craven bull; *b*, the Shropshire ox; *c*, the new Leicester bull; *d*, the Devon cow; *e*, the Hereford bull; *f*, the Hereford cow; *g*, the Sussex cow.

The most extensively diffused breed of cattle on our island, and by far the most valuable, is that termed, by way of distinction, the short-horned, and of which the central bull in Fig. 701 is an example, presenting every point in the highest excellency.

Of this breed England may justly be proud; in it is united as far as possible every good quality. The form is admirable, the oxen fatten quickly, and often attain to an enormous weight, and the cows are excellent as milkers.

It would appear that Durham and some parts of Yorkshire had long possessed a breed of short-horned cattle of large size, and celebrated for the quantity of milk yielded by the cows; but this breed, not only in figure, but in aptitude to fatten and in the quality of the flesh, required great improvement, other races far excelling it in these points, so important to the grazier. This stock still lingers, and is certainly valuable to the dairy farmer, who might, however, substitute the improved breed for it with advantage. It is about 80 years since the improved stock of this old but really fine breed began to be established on the banks of the Tees, owing to the judgment and care of the intelligent breeders of that district. It differs from the old short-horns in possessing a well-developed figure, and in aptitude to acquire fat. The first step of improvement, resulting from the practical knowledge of Mr. Milbank and other coadjutors, opened the way for the successful exertions of subsequent spirited breeders, who, by pursuing a judicious plan in crossing, have brought the breed to the highest pitch of perfection. Among these crosses it is supposed that the white wild breed has contributed a share, and to this circumstance is attributed the prevalence of white as characteristic of the stock.

Among the most successful of improvers was Mr. C. Colling, who bred the celebrated Durham ox exhibited in the years 1801-5-6, the produce of one of the ordinary short-horned cows and a bull termed Favourite, of noble figure. At five years old, says the excellent author of the work on cattle, "the Durham ox was sold to Mr. Bulmer, of Harmley, near Bedale, for public exhibition, at the price of 140*l*. This was in February, 1801. He was at that time computed to weigh 168 stones of 14 lbs.; his live weight being 216 stones: this extraordinary weight did not arise from his superior size, but from the excessive ripeness of all his points." The Durham ox in a short time passed into the possession of Mr. J. Day, who travelled with him through the principal parts of England and Scotland, till at Oxford the 19th of February, 1807, he dislocated his hip-bone, and continued in that state till the 15th of April, when he was obliged to be slaughtered, and notwithstanding he must have lost considerably during these eight weeks of illness, his carcass weighed, the four quarters 165 stones 12 lbs., tallow 11 stones 2 lbs., and hide 10 stones 2 lbs.

Among the most remarkable of Mr. Colling's experiments in breeding, was that of a cross between the improved short-horns and a polled Galloway cow, which, being interbred with the pure short-horned stock, gave origin to a breed called the *Alloy*, a term at first given by way of disparagement, but continued afterwards when the excellences of the breed were acknowledged. Some idea of its value may be formed from the fact, that at a sale of Mr. Colling's cattle forty-eight animals (cows, bulls, year old bull-calves, and heifer-calves) realized 7115*l*. 17*s*. One bull named Comet sold for a thousand guineas.

Of the Alloy breed was the stock, or part of the stock, of the late Rev. H. Berry; the figure of the cows was excellent in every respect, and their milking quality is stated to have been by no means of low degree.

Among the most celebrated of the short-horned stocks of the present day, that in the possession of Lord Althorp is one of the most distinguished. It was originally derived from the stock of Mr. R. Colling, and no pains have been spared in bringing it to the highest excellence. A celebrated bull, belonging to this nobleman, and which is known under the cognomen of Firby, may be regarded as a model of the breed. It is a peculiarity in this short-horned race, that the cows are excellent as milkers, and moreover that when dried they fatten rapidly. The oxen, as it is acknowledged, are fit for the butcher at the age of two years; but this tendency to acquire fat renders them indolent workers, and more unfitted for the team than other breeds, a circumstance of little consequence, as cattle which are profitable to the breeder at two years old, and are as ready for the butcher at this age as those of any other breed at three or even four, ought never to be submitted to the yoke. The bulls, indeed, being extremely docile, may be employed with advantage in many operations going on in every farm, a plan the more advisable as they are apt to acquire too much fat, which moderate labour would tend to diminish.

It must not be supposed that every breed of short-horned cattle is endowed with the qualities characteristic of the improved stock, which render it so valuable. There is, for example, a breed of short-horned cattle in Lincolnshire, with which the Smithfield market is abundantly supplied; but the cattle of this stock are by no means first-rate animals: the head is not finely modelled, the bone is comparatively large, the limbs high, and the hips wide. In many instances the stock has been improved by admixture with more highly bred animals, and rendered valuable, but the flesh is not fine-grained. On the whole these cattle are better adapted for the dairy farmer than the grazier, as the cows yield a fair quantity of milk.

Among the short-horned race must be enumerated that singular breed of cattle called Alderneys, which has gained, and deserves, a degree of celebrity from the peculiar richness of the milk afforded by the cows. These cattle are originally from Normandy and the islands on the French coast, from one of which (Alderney) they take their name. They are small in size, awkwardly shaped, with a peculiar bend in the back, and in every point more or less defective. The milk yielded is not great in quantity, but abounds with butter, and it is from its richness that these animals are favourites. Improbable as it might seem from the appearance of the Alderney, its aptitude to fatten is remarkable; even the cows when dried, soon gain flesh, and even acquire considerable weight. It is chiefly in pleasure grounds and the paddocks attached to the houses of persons not engaged in farming for profit, that cows of this breed are to be seen. In Hampshire alone the Alderney breed is general, constituting the stock of the farmer. It would appear that it is more suited to the pasturage of that county than others which require richer grazing grounds, consume a large quantity of food, and return a disproportionate supply of milk.

Our cut (Fig. 701) represents the following:—*a*, cow of the Alderney breed; *b*, bull of the same breed; *c*, a cow of the Alloy breed belonging to the Rev. Mr. Berry; *d*, Lord Althorp's celebrated short-horned bull Firby; *e*, a cow of the same stock; *f*, a polled or hornless cow; *g*, a short-horned cow of the West Highland breed; *h*, a Glamorganshire cow; *i*, improved Lincolnshire ox; *j*, bull of the Alloy breed; *k*, Yorkshire cow. With respect to other breeds of which we have as yet said nothing, we may observe that in the Highlands of Scotland a race of small black cattle prevails, of which large herds are driven southwards, and depastured in the grazing-lands of England. Of these numbers are brought to the London market. Of this race many varieties exist. Of these we may particularize the Kyloes of the Western Islands and the Hebrides: they are small, but hardy and well-formed, thriving on coarse fare, and producing fine-grained and high-flavoured meat. The different islands of the Hebrides contain, says Mr. Youatt, "about one hundred and fifty thousand of these cattle, of which it is calculated that one-fifth are annually sent to the mainland, principally through Jura, or across the ferry of the isle of Skye. If these average about 5*l*. per head, the amount will be 150,000*l*., or more than the rental of the whole islands, which Mr. Macdonald calculated at 106,720*l*., but which now produce a greater sum. Cattle therefore constitute the staple commodity of the Hebrides. Three thousand five hundred are annually exported from the island of Islay alone."

In the north of Argyleshire the cattle are larger than those of the Hebrides, and are bred to the full size which the pasturage will admit and the good qualities of the animal bear without deterioration. It is in this district that the most perfect Highland cattle are oftenest seen. The animals are compactly built, short and rather strong in the shank, straight in the back, with a fine muzzle and small sharp horns. As they wander over a wild country, they are wild and often fierce, and their eye expresses energy and spirit. It is solely for their flesh that herds of these cattle are reared; "every effort," says Mr. Youatt, "to qualify them for the dairy will not only lessen their hardiness of constitution and propensity to fatten, but will fail in rendering them valuable for the purpose at which the farmer foolishly aims." In the stewartry of Kirkcudbright, together with part of Ayrshire and Dumfries, forming the old province of Galloway, a beautiful polled or hornless breed of cattle exists, highly esteemed for their many excellences. In figure they are admirable, excepting that the neck of the bull is almost too thick; but the chest is deep, the limbs clean and short, the back straight, and the body round. Black is the prevailing colour. These cattle exceed the Argyle breed in size; they fatten well and quickly, and their flesh is excellent. "Few cattle sell so high in the Smithfield market, and it is no uncommon thing to see one of these little bullocks outsell a coarse Lincolnshire bullock, although the latter is heavier by several stones."

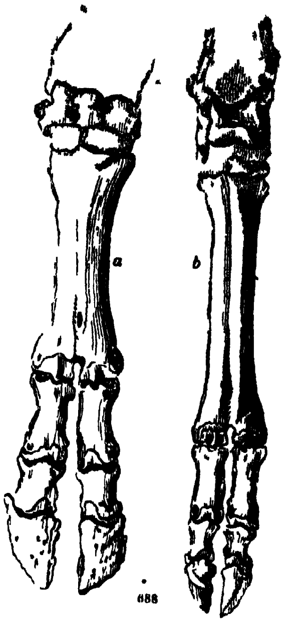
The Galloway cattle are remarkable for gentleness, and robust and muscular as the bulls are, one of mischievous habits and bad temper is seldom met with. Ayrshire, Aberdeenshire, Perthshire, and other districts have their peculiar breeds. In Wales several breeds of cattle are found; in the Isle of Anglesey there is a fine race of middle-horned black cattle, with a deep chest, heavy shoulders, enormous dewlap, and round body. The appearance of the bulls of this breed is very noble and imposing; the expression of the head is animated, bold, and even fierce; and this character is not lost altogether in the oxen and cows. It is calculated that upwards of ten thousand are annually exported from this island. The flesh of these cattle is of first-rate quality. The numerous inferior crosses or mongrel breeds of doubtful origin, into which the cattle of our island have ramified, need no especial notice.

Fig. 702 represents an Exhibition of Prize-Cattle, at the Horse Bazaar, Portman Square, London.

This annual exhibition, by the Smithfield Cattle Club, is interesting not only to those immediately engaged in agricultural pursuits, but to every one who reflects upon the importance of the ox in a commercial sense, independently of every other consideration. Here are to be seen the results of exertions principally carried on during the last eighty years, to unite and bring to perfection the most desirable points in the various breeds of domestic animals which were once peculiar to different parts of Great Britain, but are now spread in their improved form over every part of the country. In the gallery, a portion of which overlooks the show-yard, are to be seen agricultural implements and machinery of the latest and most improved construction, roots and plants adapted to our climate, but which are as yet comparatively unknown, specimens of artificial manures, and of the soils of districts differing from each other in their geological formation. In spite of all the advances which agriculture has made during the present century, how slowly do improvements extend beyond the intelligent circle in which they are first adopted; and it is one of the great advantages of institutions such as the Smithfield Club, to spread them more rapidly and widely by drawing the agriculturist from the secluded scenes in which he carries on his occupations, and bringing them before him in the manner best calculated to demonstrate their utility.

A prize ox or sheep is fatter than the ordinary market requires, and hence it is often supposed that the stimulus of prizes for bringing an animal into a state of unnecessary fatness is altogether a work of supererogation. But the power of reaching an excessive size is simply a test. A piece of arti-

702.—Exhibition of Prize Cattle



688

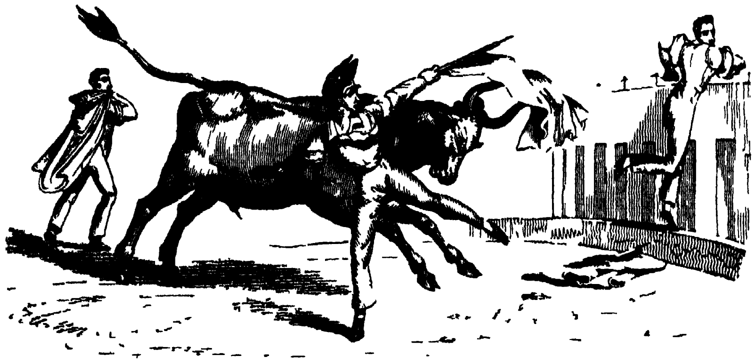
703.—Driving Wild Cattle in the Maremma.

701.—English Short-horned Cattle

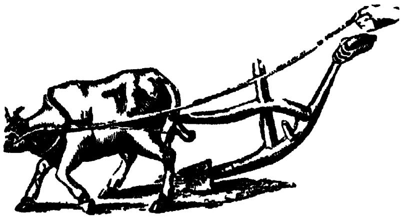
704.—Driving Wild Cattle.

723.—Modern Egyptian Ploughing.

70[illegible].—Wild Bull-hunting in the Alemtejo.



708.—Spanish Bull-fight.



722.—Ancient Plough.

705.—Bull of the Campagna of Rome.

710.—Bullock Waggon of South Africa.

lery is tried by a charge greater than is ever required in ordinary practice; and an ox is fattened for exhibition beyond a useful marketable condition simply to show the capacity of the breed for acquiring, at the least expense of food, and at the earliest age, such a condition as the public demand really renders necessary.

We must now leave the subject of British cattle, and comment upon our pictorial specimens from other portions of the globe.

Figs. 703, 704.—These delineations present us with an uncouth, savage, half-wild breed of cattle, spread through the Maremma of Italy. The Maremma is a flat stripe of country, except in a few places where hills intervene, extending from the mountains of Genoa to the extremity of Calabria, a length of about seven hundred miles. Its breadth is from the base of the lower range of the Apennine chain to the shore of the Mediterranean. This sweep of country is pestilential in the extreme in summer, and though it yields the most luxuriant harvests, is only partially brought into cultivation, the greater portion being left for pasture. Here, besides the cattle used as beasts of burden, or draught, and employed in the work of the farms, large herds roam unmolested under the care of keepers, which, together with the buffalo-keepers, and forest-rangers, are the only stationary population in the wild Maremma. The former, as wild and savage as the animals under their charge, are always mounted on fleet horses, and armed with a long lance, which they use in driving the cattle, and in defending themselves against the fierce bulls, which, as well as the buffaloes, are extremely dangerous. These men are often criminals, who have fled from justice into the Maremma, where they are obliged to sojourn, and are often employed by the proprietors of the farms and cattle, as rangers or drivers. Those who are not fugitives adopt their occupation from choice, which, dangerous and laborious as it is, is one of independence and freedom; they are the analogues of the Arab of the desert, or the Gauchos of the Pampas. Besides being paid for their services, they rear cattle of their own, which they are allowed to feed with the rest. In the summer months they retire to the shady forests along the sea-shore, where the air is not so unwholesome as in the open plains. The cattle are collected at various times, and driven by these men, called vaccari, to the fairs held in the towns, for sale. Both the bull and the buffalo are baited in Italy, by men and dogs, for the entertainment of the Roman people, who seem to be as fond of circenses as were their great predecessors. The scene of the sport, which is called La Giostra, is, like many other buildings in Rome, a curious compound of the modern and ancient. The Amfiteatro Correa, as the place is designated, is situated in the massive cluster of buildings raised upon the site, and partly with the materials, of the mausoleum of the emperor Augustus in the Campus Martius. The walls of this amphitheatre and the seats are all of modern structure. The arena occupies the platform of the ancient mausoleum, which in other times was cultivated with flowers and rare shrubs, while the pyramid that bore the statue of Octavius rose in the midst. The vaults beneath, which once held the ashes of the Cæsars, are now in part used as dens for the wild cattle that are brought in from the Campagna and other places to be baited. Twice every week during the summer do these exhibitions take place: they begin at five in the evening, and last till dusk.

accord, as if glad to escape. When the bull, as is sometimes the case, perseveringly follows a man, and presses him hard, he catches hold of one of the iron rings placed at certain distances round the wall enclosing the arena, and by a rapid movement springs to the top, which like a terrace runs round the foot of the lower seats of the amphitheatre. The height of this parapet is 6 or 7 feet, and it requires great agility, strength, and presence of mind, as well as precision, to avoid being pinned to the wall in the act of taking the leap; such accidents sometimes happen, but when the Giostratori see one of their number thus endangered, they use every means to divert the bull's attention.

The bull (and also the buffalo) is on some occasions baited with fierce dogs of the Corsican breed, resembling our bull-dog, and distinguished by the same "tenacity of tooth" and indomitable courage. They usually pin the bull by the nose or lip, but are very frequently tossed in the air, or ripped up by the sharp horns of the maddened animal. At these exhibitions, strange to say, females are among the spectators, and not less interested than the rougher sex.

Some of the bulls procured in the Campagna of Rome are very noble and spirited animals, of fine figure and great strength.

Fig. 705 represents a bull of the Campagna of Rome.

In Spain and Portugal, where extensive wilds and forest lands afford ample pasturage, large herds of oxen, born in freedom, wander uncontrolled, and untroubled, excepting by man, from whom they flee with precipitation, till roused to fury by his assaults, when they attack in turn, and bear upon him with resistless impetuosity. It is from these herds that the Spaniards and Portuguese select the fiercest and boldest for the revolting contests of the arena; while others are tamed, and broken in for the ordinary purposes of husbandry.

We may easily imagine the excitement produced by the chase and capture of a herd of these fierce animals, and the danger to man and horse. The engraving (Fig. 706) represents such a scene in the great forest of Alemtejo.

The chase is thus described by an eye-witness, who was engaged in it:—"I had received," he says, "intimation that the village of Alcoxete, on the Tagus, was to be the scene of a bull-fight, and that the villagers for many miles were invited to join in the hunt, which was to take place the following day. I accordingly crossed the river in the company of about twenty persons, each being provided with a long pole having a small spike fixed in one end, and mounted as inclination or ability suited. When we arrived at the opposite bank a little before daybreak, we found about two hundred and fifty or three hundred persons assembled, some mounted on different sorts of quadrupeds, from the noble Andalusian horse to the humble donkey, and many were on foot. All were armed in a similar manner to ourselves. We divided into two parties, one stretching in a long line to the right, the other to the left; not far had we advanced in this manner, when we fell in with a herd of cattle having twelve bulls with it, which no sooner descried us, than they bounded off with the speed of lightning. The sport had now begun; we put our horses to the utmost speed, threading our way among the tall pine-trees as well as we could, and endeavouring by wild cries to drive the bulls towards the other party. At length, after about an hour's chase, some half-dozen of us, who were better mounted than the

ried off severely wounded by the horns and feet of the bulls. Redoubling our efforts, however, we at length, about four o'clock in the afternoon, succeeded in driving them into an inclosure, where a number of oxen (all at one time wild) were quietly grazing. Here they were kept till required for the next day's sport." These bulls were baited in the square of Alcoxete, converted into a temporary arena, and afterwards reduced to a complete state of servitude. The picadores, or men who encountered them, were on foot, and only armed with short darts, and displayed the most surprising courage and address, and when at last they were to be thrown, a man leaping between the horns (Fig. 707), there supported himself till the cords were lashed round the animal's limbs.

The bull-fights as conducted in the amphitheatre of Spain and Portugal, the lingering relics of those contests in which Rome so much delighted, and which prevailed more or less throughout the Roman empire, have been often described. These sanguinary spectacles are the delight of the Spanish people, and are not only tolerated, but encouraged by the higher classes of both sexes, who find great satisfaction in the torments which the bull endures from the lance of the cavalier, or the horse from the horns of the bull.

The most graphic and spirited description of this "ungentle sport" is that by Lord Byron, in 'Childe Harold's Pilgrimage,' canto i., which we forbear to quote, feeling assured that all are familiar with it. In a note by Sir J. C. Hobhouse the following additional particulars are recorded:—"The magistrate presides, and after the horsemen and picadores have fought the bull, the matadore steps forward and bows to him for permission to kill the animal. If the bull has done his duty by killing two or three horses, or a man, which last is rare, the people interfere with shouts, the ladies wave their handkerchiefs, and the animal is saved. The wounds and death of the horses are accompanied with the loudest acclamations and many gestures of delight, especially from the female portion of the audience, including those of the gentlest blood." Fig 708, representing a bull-fight, shows the manner in which—

"the matadores around him play,
Shake the red cloak, and poise the ready brand"

before dealing the fatal blow which severs the spinal chord at the back of the neck.

Of the effects of such exhibitions on the character of the people nothing need be said; whatever atrocities may be committed by men "nurtured in blood betimes" cannot surprise us.

Within the Arctic Circle the ox gives place to the rein-deer, but in Iceland cattle are reared in great numbers, and are valuable. In size and appearance, excepting that they are seldom horned, they resemble the breeds of the Scottish Islands. It would appear that the Icelandish farmers conduct the breeding of their stock on no principles; consequently, there is great room for improvement; nevertheless, the cattle on the whole are handsome, and the cows yield a considerable quantity of milk. In Norway and Sweden cattle are numerous, and also in Russia; as is well known, the main exports from Russia to England are tallow and hides. In that extensive empire vast numbers are reared, principally in the southern provinces, and the markets of St. Petersburg and other towns are supplied by cattle sent from distant parts of the country. The herdsmen live in a state of barbaric simplicity, and are nomadic in their habits; they travel with in the latter district, indeed, the people continue in a great measure their ancient nomadic habits, making use of the services of the ox as a beast of draught or burden: united in immense caravans, they roam over an immense extent of territory, transporting in tall vehicles of singular construction various articles of produce, provisions, and other things to the towns scattered at wide distances about the vast plains of Moldavia. Day by day they move cheerfully on, to the slow and measured sound of the footsteps of their oxen, and are often an entire month without seeing a single human habitation. At the approach of evening the caravan halts, the numerous waggons are disposed in the form of a square, and the oxen are turned out to graze at large, under the watchful care of intrepid dogs who accompany the caravan. In the middle of the square a fire is now lighted, at which the conductor prepares his simple repast, and afterwards disposes himself for sleep, sheltered by a warm and heavy coverlid that completely enwraps him. These indefatigable walkers are no less excellent riders: they possess a fine race of horses, which are employed for drawing lighter vehicles, while the heavier waggons are drawn by the slow oxen. There are no high-roads in Moldavia, the plain is open, and each traveller chooses his own track, and it is often with difficulty that the oxen can drag their way through heavy ground. Storms of wind, rain, or snow make the matter worse, so that a passage can only be achieved by great patience, labour, and resolution. The sketch (Fig. 709) represents a bullock-caravan of Moldavia wending its weary way over the vast plains of Moldavia, while lighter vehicles drawn by swift horses are seen in the distance. It is by these caravans that the trade and commerce of Moldavia are carried on, and the town supplied with grain.

In Switzerland there is an excellent breed of cattle, and in no country are these animals more carefully attended to, or held in greater esteem for their utility, as far as the dairy is concerned. Travellers have frequently noticed their docility and intelligence, which they have at the same time not a little exaggerated. It is customary to hang bells round the necks of the cattle, sheep, and goats, in order that if they stray among the hills and mountains the herdsmen may be directed by the sound in his pursuit of them, the slightest tinkle being heard at a great distance in those lofty and still regions. The cows selected to bear the bell become accustomed to it from habit, and often, we doubt not, betray signs of uneasiness when deprived of it, but the account given by some writers respecting their feelings borders on the ludicrous. "The cow, whose superior beauty, sagacity, or good conduct seems to calculate her for the leader of the herd, is always on gala days distinguished by the largest and finest toned bell, and the bravest ornamental collar, and so down through all the gradations of good, to the small appendage that marks the indifferently good or clever animal and the total absence of ornament and distinction which points out the self-willed or vicious. If any cow has been guilty of straying, of unseemly behaviour, breach of discipline, or any vicious trick, the displeasure of the vacher is not testified by blows, but by the temporary deprivation of her bell, and this seldom fails to reduce her to order and prevent a repetition of the offence. It is only necessary to see the cow on a gala day, with her badge of distinction strapped round her neck, and then to see her deprived of it for some reason or other, to be convinced that this is true. She is now gay, good humored, and frolicsome; then sulky and gloomy.' (Latrobe's 'Alpenstock.')

The pastoral economy of Switzerland, which is common to Savoy and other alpine countries, and the annual progress of the shepherds and cowherds with their flocks and cattle to and from the mountains, are interesting. The richer proprietors and breeders in the Alps possess tracks of pasturages, and sometimes houses, at different heights. In winter they live at the foot of the mountain in some sheltered valley, but this they quit in the spring, and ascend gradually, as the heat brings out vegetation, on the higher lands. In autumn they descend by the same gradations to the valley. Those who are less rich have a resource in certain common pastures, to which they send a number of cows proportionate to their means of keeping them during the winter. Eight days after the cows have been driven up to these common pastures, all their owners assemble, and the quantity of milk each cow produces is accurately weighed. This operation of weighing is repeated one day in the middle of summer, and again at the end of the season. The milk of all the cows has, in the meanwhile, been put together and made into butter and cheese, and this common product is divided into shares according to the quantity of milk each owner's cows yielded on the days of trial.

In some parts of Switzerland, and more particularly in the retired parts of the Forest cantons, the peasants make use of the Alp-horn for the purpose of collecting their herds. This primitive instrument is a tube of wood about five feet in length, of very simple construction; it produces a deep, mellow, and prolonged note, resounding to a great distance, floating over the upland pastures, and echoing from crag to crag and from rock to rock. On hearing the well-known summons, which is regularly given at sunset, the cattle bestir themselves, and wend their way to the châlet, where the peasants are waiting their arrival. The deep note of the Alp-horn heard among the mountains, and multiplied by echoes till the last tone dies away, produces a pleasing impression on the traveller, which he long remembers.

Fig. 710 represents a scene on the banks of the Vaal river, South Africa, illustrative of the uses of the ox in that country, where its services as a beast of draught and burden are of the greatest importance. Waggons drawn by oxen, often cruelly overtasked, are the ordinary travelling vehicles of South Africa, and are admirably adapted for the country, which is rugged and mountainous, and generally destitute of any other roads than the rude tracks originally struck across the wilderness by the first European adventurers. Each waggon is provided with a canvas tilt, to protect the traveller from sun and rain, and is drawn by a team of six, eight, or even twelve oxen, fastened with wooden frames to a strong central trace, or trek tow, formed of twisted thongs of bullock's hide. The driver who sits in front, has a whip of enormous length, which he often uses with unsparing severity.

Formerly, indeed, if the account given by Barrow is to be credited, the treatment exercised by the Dutch African boors to their oxen was brutal in the extreme. The Dutch boors, moreover, made use of very large and clumsy waggons, and delighted in transporting tremendous loads at a time. It was a common sight to see six, eight, ten, or even a dozen pair of oxen yoked to an enormous vehicle. But even this number was inadequate to such burdens as they had to draw, and the resistance of such roads. The most disgraceful cruelties were used to force these poor creatures on their way. Their drivers cut them with knives, and when, worn out, they laid themselves down, and refused to rise, it was a common practice to light fires under their sides and so force them to go. One of these brutal boors, whose knife had been often employed on the flesh of his cattle, boasted that he could start his team at full gallop by merely whetting that knife on the side of his waggon. Once as he was exhibiting this experiment, the waggon was overturned, and one of the company, "unfortunately not the proprietor," says Mr. Barrow, "had his leg broken."

When the Dutch took possession of the Cape of Good Hope, they found the Hottentots a pastoral people possessed of flocks and herds: the oxen were of large size, with the horns long and sweeping forwards and upwards, and they were not only trained for riding, but even as guardians of the flocks and cattle, and as instruments of destruction in battle. "The Hottentots, says Kolben who visited them while they yet retained their name and independence as a nation, have oxen which they use with success in battle; they call them Bakeleys: every army is provided with a large troop of these war-oxen, which permit themselves to be governed without trouble, and which their leader lets loose at the appointed moment. The instant they are set free they throw themselves with impetuosity on the opposing army, they strike with their horns, they kick with their heels, they overthrow, they rip up and trample beneath their feet, with frightful ferocity all that opposes them; they plunge with fury into the midst of the ranks, and thus prepare for their masters an easy victory. The manner in which these oxen are trained and disciplined certainly does great honour to the talent of these people."

Le Vaillant, who was in South Africa in 1781, saw some of these oxen, which were then, as he states, only used by certain tribes of Hottentots, but he gives the same account of their mode of fighting as Kolben, who also describes the Bakeleys as guardians of their flocks. "When out in the pasture grounds, at the least sign of their conductors, they will hasten to bring back the cattle which are straying at a distance, and keep them herded together; they rush on strangers with fury, whence they are of great service against the Boschmen, or robbers, who may attempt to plunder the flocks. Each kraal has at least half a dozen of these bakeleys, which are chosen from among the most spirited oxen; on the death of one, or when one in consequence of old age becomes unserviceable, in which case its owner kills it, another ox is selected from the herd to succeed it. The choice is referred to one of the old men of the kraal, who is thought to be most capable of discerning that which will most easily receive instruction. They associate this noviciate ox with one of long experience, and they teach him to follow his companion, either by beating or some other method. During the night they are tied together by the horns, and they are also thus kept tied during the greater part of the day, until the learner has become a good guardian of the flock. These guardians know all the inhabitants of the kraal, men, women, and children, and testify the same respect towards them that a dog displays towards all those that live in the house of his master. There is, therefore, no inhabitant of the kraal who may not with safety approach the flocks; the bakeleys never do them the least injury; but if a stranger, and particularly a European, should offer to take the same liberty without being accompanied by some Hottentot, he would be in great danger from these guardians of the flock, which usually feed round it, and which would come upon him full gallop. Then, unless he be within hearing of the shepherds, or have firearms or good legs, or unless a tree be near in which to climb, he is sure to be killed: it would be useless for him to have recourse to sticks or stones, a bake-ley has no fear for such feeble weapons."

Sparrman, who visited South Africa in 1775, was one of the last travellers who found the Hottentots in their original state of pastoral freedom; he mentions a woman who was possessed of sixty milch-cows, and that, on the cattle of the kraal being brought home from pasture, the evening was enlivened by singing and dancing.

The Caffres, Corannas, and other tribes have oxen in abundance, which are employed as beasts of burden. The Corannas are a nomade race, frequently removing with their flocks and herds to fresh pasture-land, and transporting their mats, tents, and utensils strapped on the back of oxen, which also carry themselves and their wives and children.

"Fast by his wild resounding river
The listless Coran lingers ever;
Still drives his heifers forth to feed,
Soothed by the gorrah's humming reed;
A rover still unchecked will range,
As humour calls, or seasons change;
His hut of mats and leathern gear
All packed upon the patient steer."

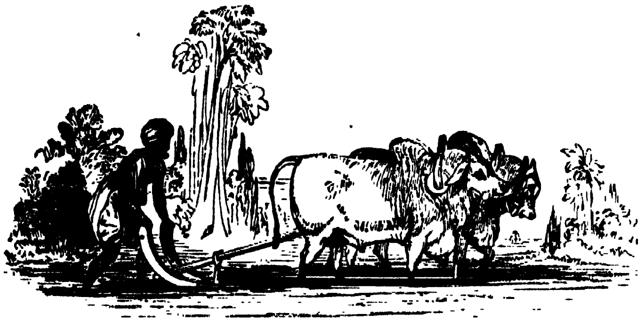
PRINGLE.

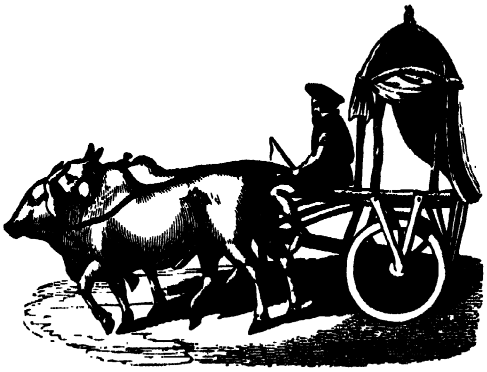
Burchell thus describes the saddle-oxen of South Africa: "These oxen are generally broken for riding when not more than a year old. The first ceremony is that of piercing the nose to receive the bridle, for which purpose they are thrown on their back, and a slit is made through the septum, or cartilage between the nostrils, large enough to admit a finger. In this hole is thrust a strong stick stripped of its bark, and having at one end a forked branch to prevent its passing through. To each end of it is fastened a thong of hide, of a length sufficient to reach round the neck, and form the reins; and a sheep-skin, with the wool on, placed across the back, together with another folded up and bound on with a rein long enough to pass several times round the body, constitutes the saddle. To this is sometimes added a pair of stirrups, consisting only of a thong with a loop at each end slung across the saddle. Frequently the loops are distended by a piece of wood to form an easier rest for the foot. While the animal's nose is still sore, it is mounted and put in training, and in a week or two is generally rendered sufficiently obedient to its rider. The facility and adroitness with which the Hottentots manage the ox have often excited my admiration. It is made to walk, trot, or gallop at the will of its master, and being longer legged and rather more lightly made than the ox in England, travels with greater ease and expedition, walking three or four miles in an hour, trotting five, and galloping on an emergency seven or eight."

In other parts of Central Africa the ox is employed in like manner. Major Denham thus gives an account of its use in the central countries which he visited:—"The beasts of burden," he observes, "are the bullock and the ass. A very fine breed of the latter are found in the Mandara valleys. Strangers and chiefs in the service of the sheikh, or sultan, alone possess camels. The bullock is the bearer of all the grain and other articles to and from the markets. A small saddle of plaited rushes is laid on him, when sacks made of goat-skins, and filled with corn, are lashed on his broad and able back. A leathern thong is passed through the cartilage of his nose, and serves as a bridle, while on the top of the load is mounted the owner, his wife, or his slave. Sometimes the daughter or wife of a rich Shouaa will be mounted on her particular bullock, and precede the loaded animals, extravagantly adorned with amber, silver rings, coral, and all sorts of finery, her hair streaming with fat, a black rim of kohal, at least an inch wide, round each of her eyes, and, I may say, arrayed for conquest at the crowded market. Carpet or robes are then spread on her clumsy palfrey; she sits *jambe de ça, jambe de là*, and with considerable grace guides her animal by the nose. Notwithstanding

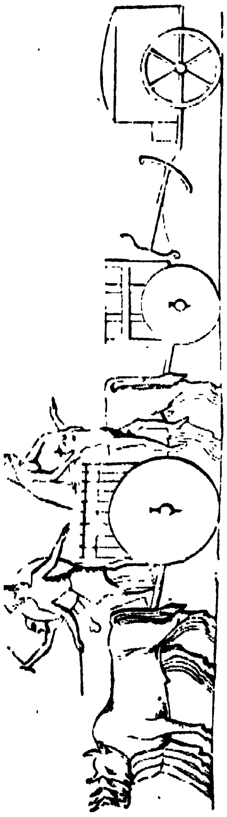
718.—Ancient Egyptian Ploughing.

709.—Bullock Caravan in Moldavia.

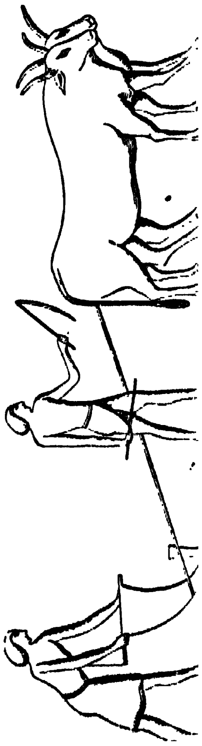




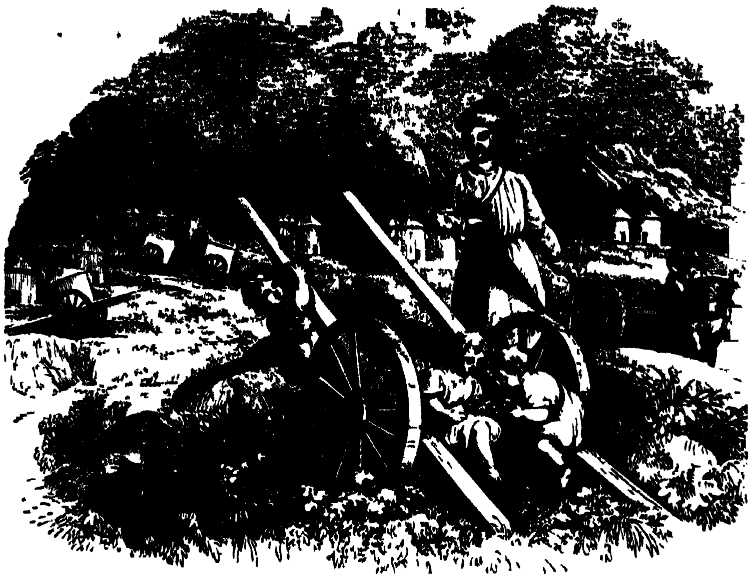
720.—Zebus and Car.



725.—Oxen and Carts: from Egyptian Sculpture.

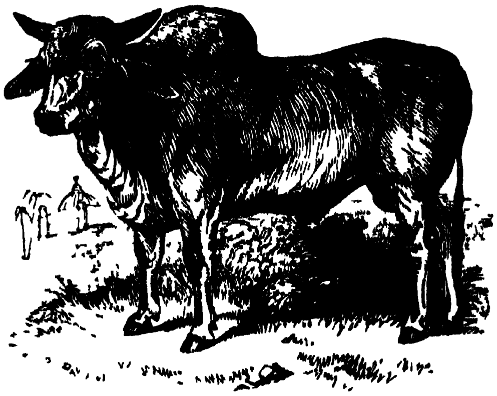


730.—Zebus and Indian Car.

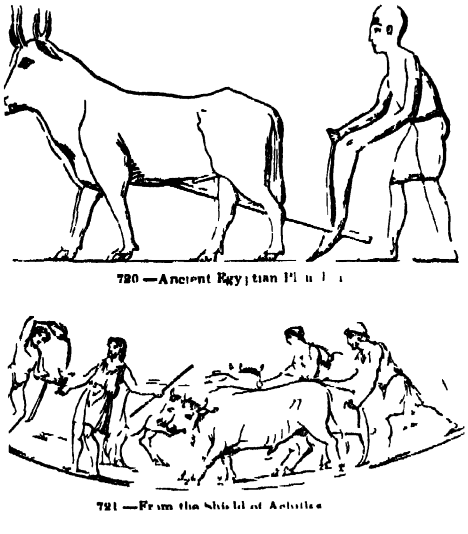


735.—Bullock Carts of the Nomade Tartars.

732.—Zebus of

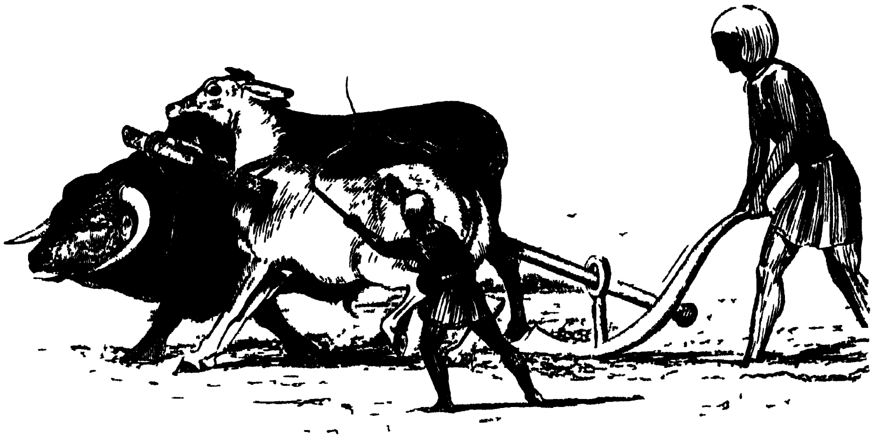


731.—Indian Zebu.



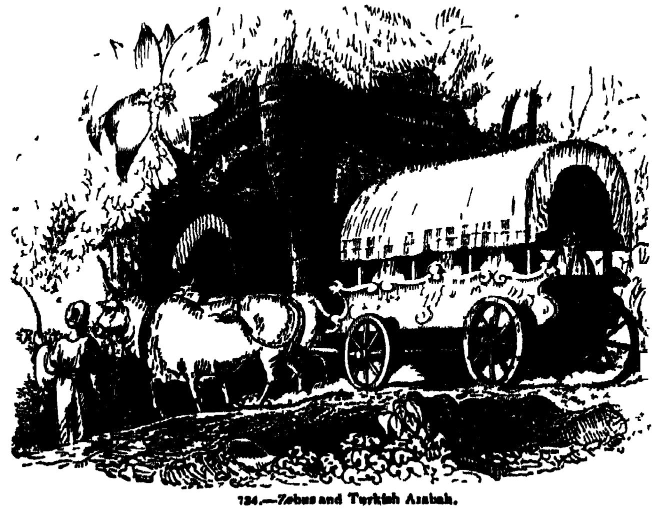
720.—Ancient Egyptian Plough.

721.—From the Shield of Achilles.



713.—Ploughing with Ox and Ass.

733.—Brahmin Zebu Bull.



734.—Zebus and Turkish Arabah.

the peaceableness of his nature, her vanity still enables her to torture him into something like caperings and curvetings."

The ox was one of the first of the domestic animals carried over to America by the early Spanish settlers; there it has multiplied and spread, and indeed in some degree has recovered its original independence. Herds of wild oxen roam the Pampas, where they are hunted and slain for their hides, which form an important article of commerce. These wild herds are in some districts exceedingly numerous; they differ in no respect from their domestic relatives, and are themselves rendered tame without much difficulty. According to Azara, "Captain John de Salazar, born in the city of Pomar in Arragon, transported from Andalusia seven cows and a bull to the coast of Brazil, from thence he conducted them overland to the river Paraña at the place opposite to where it receives the river Mondai. He there constructed a raft, placed the cattle on it, and gave them in charge to a certain Gaëté, whilst he himself went by land to Paraguay. Gaëté descended the Paraña to its union with the river of Paraguay, and steering up this, he safely arrived at the city of Assumption in 1546. He spent many months in this voyage, and as he had only one cow given him for payment, the saying has hence arisen in allusion to the great value of anything, 'It is dearer than Gaëté's cow.' The second founders of Buenos Ayres took, in 1580, some cows from Paraguay, which multiplied in the neighbourhood; and, from want of due care, many of them became wild, and bent their course towards Rio Negro. The Indians of the Cordillera of Chili became acquainted with these animals, which had already attained their boundaries, and they commenced to carry from them herds of tamed cattle to Chili, where the presidents of this settlement purchased them from these Indians. Those Indians who could not live in their country without some resource, established themselves in the plains which were occupied by these cattle, and some even mixed with the Pampas Indians In the meantime, the Indians who were unsubdued destroyed the cattle to the south of Buenos Ayres, the Spaniards of those parts, however, did not neglect to take a portion, which they conducted to Cordova and Mendoza, whilst the Spaniards of Buenos Ayres made up entire cargoes of the hides of bulls and cows, for at that time the animal itself was not considered of value, its skin being all that was sought after. The result of all this and the same will soon take place at Monte Video) was, that towards the middle of the century wild cattle no longer existed in the Pampas; and the unsubdued Indians saw themselves under the necessity of stealing the domestic animals or of making incursions into the estancias of the Pampas This was the commencement and cause of the bloody war which the Spaniards had with the Indians. The herds of these revolted or wild cattle, which are also called orellards in the plains of Monte Video, do not pass to the north of the southern establishments of the Guaranis Missions. The following is the account which I have collected of their origin:—The city authorities of Buenos Ayres, in the name of certain of its inhabitants, as is proved by its archives, made, at the commencement of the century, contracts, on the one part, with the English, for the acquisition of Negroes, and, on the other part, with certain Spaniards, who were thus authorized to procure the hides of the animals on the plains situate to the north of the Rio de la Plata on payment to the city of a certain tax, of which the sum total was shared between these Spanish inhabitants, who from this circumstance were called Actionnaires. The primitive source of this right or this proceeding is not known, but certain it is that all the inhabitants did not participate in it, and that its produce was the exclusive share of these Actionnaires, who were the descendants of the earliest of the original settlers. Such is the origin of the horned cattle of these countries, where they prodigiously multiplied* About eight hundred thousand ox-hides are annually exported from Buenos Ayres and Monte Video to Europe." Mr Darwin states, "that from the latter place the annual exportation is three hundred thousand, and the home consumption from waste very considerable. In order to obtain these hides, some horsemen join together and arrange themselves in two ranks which form an angle; they then press on the two sides a small number of cattle, and one of the horsemen who goes last in the angle hamstrings the animals with a knife in the shape of a crescent or half-moon, fastened at the end of a staff. While this goes on the horsemen continue to ride forwards, and when they have thus secured a sufficient number of animals they retrace their steps; and the person who hamstrung them gives each beast thus maimed a finishing stroke with a sharp spear, and the horsemen dismount to strip the carcass, sometimes of the fat and suet, but always of the skin: this they do with such dexterity, that some men without assistance will strip twenty-six cattle at a day's work. When a single head of cattle is to be killed for the sake of its flesh, a horseman throws a lasso over its horns or neck, and another does the same over one of its feet; then straining in opposite directions they prevent it from struggling free, and so strangle it. Admirable is the dexterity with which, when the animals pass as they rush forwards, the lasso is thrown, so that directed backwards under its feet, the animal at the pleasure of the horseman is entangled either by one foot or by two together."

It is a singular feature in the history of the New World that so many of our domestic animals there imported should have returned to their primitive independence: the ox, the horse, the hog, the ass, the rabbit, the cat, and the dog, have thus estranged themselves from the control of man. Individuals have at different times escaped from confinement or been neglected; a vast region lay before them, presenting abundance of food, they multiplied, and their offspring in turn; and thus within a brief period have the plains of the New World been peopled by alien races of animals, which claim Asia or Europe as their starting-point.

America is not the only portion of the globe to which, by the agency of man, in modern times, the ox has been introduced. We allude to Australia, New Zealand, and the groups of islands which sprinkle the Pacific Ocean "With the appearance of Vancouver," says Otho von Kotzebue, speaking of the Sandwich Islands, "arose the fortunate star of these islands. Among the innumerable benefits he conferred upon them, they are indebted to him for the possession of sheep and cattle; Tameamea (the native king) declared these animals under a tabu for ten years, which allowed time for so large an increase, that they now run wild in the forests." Of the benefits resulting from the introduction of the ox into a country naturally destitute of it, nothing need be said; but the gift of cattle to a people who, though yet uncivilized, are yet capable of appreciating their value, is to commence a revolution in their state and condition immeasurably for the better: for the possession of property is one of the bonds of society, and the desire of acquiring it the great stimulus to industry. With the introduction of the ox, the condition of the people of these islands must necessarily be improved. Not only will cattle be reared for home consumption, but for supplying the ships that navigate these seas (whalers, &c.), other valuables being given in exchange, hence will the rearing of cattle be generally undertaken. this involves care and attention, and a state of peace; agriculture and commerce follow, and prepare the way for the arts of civilized life.

To Asia and its border-lands let us turn our attention—regions in which the ox from the earliest epoch has been in a state of domestication, and where this animal, with sheep and goats, constituted the riches of patriarchs, and chiefs, or princes, who deemed it not beneath them to take an active interest in the management of their flocks and herds. In that age of patriarchal simplicity such scenes as that (Fig. 711) delineated by the pencil of Berghem were not imaginary, and the pastoral poetry of classical antiquity has not only rendered them familiar, but thrown an air of grace and even dignity over them.

In the fourth chapter of the Book of Genesis (ver. 20 we read of Jabal that "he was the father of such as dwell in tents, and of such as have cattle." In the thirteenth chapter of the same book cattle are enumerated as forming part of the riches of Abraham and also of Lot; and in the previous chapter we read that oxen were presented by the Pharaoh of Egypt, together with sheep, asses, and camels to Abram, during his sojourn in that land. In the eighteenth chapter, veal, or the flesh of the calf, and butter and milk, are mentioned as articles of food. Subsequently abundant mention is made of all these domestic animals, while at the same time we glean that a wild race of oxen long continued to exist in Syria and the adjacent regions, for instance, in the Mosaic injunctions regarding animals to be used as food (*Deut.* xiv. 5) the wild ox is expressly noticed, and Isaiah alludes also to the wild bull ("as a wild bull in a net"). Hence it would appear, that though a domestic breed, established at a period antecedent to historic record, the Scripture outline excepted, formed part of the wealth of man in the primeval ages of his history, that a wild race still tenanted their aboriginal pasture-lands. Wild oxen are exhibited in the Egyptian sculptures, and the chase of them is often represented: they were sometimes hunted with dogs, the huntsmen bearing bows and arrows, and sometimes they were caught with the noose or lasso, as depicted in our outline (Fig. 712).

The utility of the ox was well appreciated in ancient times, insomuch that it became an emblematic object of worship among most of the nations of antiquity. The traditions of every [illegible] nation enro the cow among the earliest productions, and represent it as a kind of divinity. Among the Egyptians, the god Apis was worshipped in the form o a bull, and Herodotus describes the ceremonies attendant upon the choice of this bovine deity, to whose honour other bulls chosen by the priests were sacrificed. The goddess Isis was represented by the same people under the figure of a woman with the horns of a cow, as the Grecians represented Io; and the sacrificial offering was a bullock; the cow was never sacrificed, being sacred to Isis. The veneration of the cow was equally prevalent in Lybia. The Lybians, says Herodotus, from Egypt to the Lake Tritonis, are breeders of cattle, eat flesh, and drink milk, but abstain from the flesh of cows, as do also the Egyptians, and will not keep swine. Nay, among the women of Syrene, to strike a cow is accounted a crime, because they celebrate the feasts and festivals of the Egyptian Isis. Neither will the Barcæan women taste the flesh either of a hog or of a cow.

In India, where in many points the practice and worship of the ancient nations were the same as those of the Egyptians, the ox was held sacred, and st[illegible] so by the Brahmins. The religious writings of India say that the cow was the first animal created by the three gods who were directed by the supreme lord to furnish the earth with animated beings. In the sculptures of the cave-temples of Ellora, the sacred bull is represented with great truth and spirit. Colonel Tod ('Trans. Royal Asiatic Soc. vol. ii., p. 560) says, "In Hindu mythology the bull Nanda is at once the guardian of one of the two gates of heaven, of Iswaro or Bal-Siva, and his steed. The astronomic allusion thus blended with mythology is evident, viz., the entrance of the sun into the sign Taurus, the equinoctial festival of remote antiquity, and regarded as a jubilee by the Indo Scythic nations hemming the shores of the Mediterranean to the Indian Ocean." We need not say how the idolatry of the Egyptians affected the Israelites, and mingled itself with the religious ceremonies of other nations, whose worship required the ox as a sacrifice to imaginary deities.

The estimation in which the ox was held, and which led to its consecration, did not arise from the circumstance alone of the cow yielding milk, nor from the value of the flesh of the animal as food, but from its services in agricultural labour.

It was employed as a beast of burden, for the cart, for the plough, and for treading out the grain from the ear Our pictorial collection presents us with many illustrations of its use in these points among the ancients, and which need no detailed description to render them intelligible.

The Mosaic ritual lays down several rules respecting the treatment of the ox: one forbids the yoking together of the ass and the ox in the same plough (Fig. 713), perhaps from the inequality of their size and strength, which would render the draught irregular, and oppress both animals. Another injunction is, "Thou shalt not muzzle the ox when he treadeth out the corn." The first idea suggested by this passage is, that the operation of threshing was effected simply by the feet of the cattle passing over the sheaves, and, such indeed, was the case in the times of patriarchal simplicity. Afterwards, as other passages show, rollers and wheels of wood, and threshing instruments with teeth, were used: these were drawn over the sheaves by oxen, and greatly facilitated the process. With respect to the primitive mode of threshing by means of the feet of oxen, there is express allusion to it by Homer, which proves that the practice was common in his time and country.—

> "As with autumnal harvests covered o'er,
> And thick bestrewn, lies Ceres' sacred floor,
> Where round and round with never wearied pain,
> The trampling steers break out th' unnumber'd grain."
>
> Pope's Tr. *Iliad*, xx., lines of Orig. 495–8

The ancient Arabs, Egyptians, and Romans, as well as the ancient Greeks, threshed their corn in this manner: Virgil ('Georg.' lib. i.) describes the manner in which the threshing-floor is to be laid down, showing that nothing like our modern mode of threshing could have been practised. In Syria, Egypt, and Nubia, at the present day, the grain is, as formerly, either trodden out by the feet of oxen or mules, or partly trodden out, and partly crushed out by means of a roller or other machine which the oxen drag after them, and which more or less destroys the straw, and even injures the grain. Figs. 714 and 715 represent two modes of threshing, viz. by the drag, and by the sledge upon rollers, still practised in Egypt, Syria, and Western Asia.

Our representations of oxen drawing the ploughs in ancient times (Figs. 716, 717, 718, 719, 720, 721, 722), and in Egypt at the present day (Figs. 723 and 724), illustrate many allusions in the sacred and classical writers. The plough was a very simple instrument, as it still continues in the East, and is rather formed for turning up superficially a light soil, than for making deep furrows in heavy land. It appears that the ploughman, to work it effectively, was under the necessity of guiding it with great care, bending over it, and loading it as far as possible with his own weight, otherwise the share would only glide the surface without making a furrow, and the slightest inattention or cessation of his labour would be followed by the dragging out of the share from the earth, or by irregularity in the depth and direction of the furrow; hence the expression of Pliny, "arator, nisi incurvus, prævaricatur." The illustrations of the use of the ox in ancient times in Egypt (Fig. 725) and in modern Syria (Fig 726) as well as in Tartary by the nomadic people (Fig. 727), need no particular comment.

---

* In the Falkland Islands the wild cattle and horses were introduced by the French in 1764: the cattle are magnificent, but the horses small.

Fig. 728 represents the Ox of Syria, together with the wild Ass and Camel.

Figs. 729, 730, 731, 732, 733, 734, 735, are illustrations of the Zebu breed of oxen, which claims a few observations. Whether the zebu breed of oxen be derived, as some contend, from a distinct origin from that of the ordinary ox, we will not attempt to determine: suffice it to say that it presents marked peculiarities which clearly characterize it. Narrow high withers surmounted by a large fatty hump, an arched back rising at the haunches and suddenly falling to the tail, slender limbs, a large pendulous dewlap falling in folds, long pendent ears, and a peculiarly mild expression of the eye, proclaim the zebu race—a race varying in size from that of our largest cattle to that of a young calf This breed is spread over India, China, and the Indian Islands; it is also found in Madagascar and on the eastern coast of Africa, in the interior regions, and parts of the western coast, and is used for the ordinary purposes of draught and burden India appears to be its parent country, and we may readily believe that in remote ages, when an extensive commerce existed between that country and Egypt, it was introduced into the land of the Pharaohs. In Upper Egypt, Abyssinia, and Ethiopia, it is now almost exclusively prevalent, but in Lower Egypt, as we learn from Burckhardt, the zebu or humped race is unknown. In the ancient Egyptian representations of animals, both the humped race and the ordinary ox with long horns are clearly depicted (Fig 736.) It is the zebu ox which is sculptured in the cave-temples of Ellora, and the seven pagodas, as they are commonly called, at Mahâmalaipur on the Coromandel coast We have thus proofs of the extreme antiquity of this breed, and of its distinctness at a remote era from the ordinary ox, and that its peculiar characters were what we now see.

Buffon observes that the ox without a dorsal hump (which he erroneously terms the Aurochs race) occupies the cold and temperate zones, and is thinly distributed towards the regions of the south, on the contrary, the ox with the hump (which he terms also erroneously the Bison race) exclusively occupies all the southern regions—namely, the entire continent of the Indian empire, the islands of the Eastern and Southern seas, and the whole of Africa from Mount Atlas to the Cape of Good Hope, including Madagascar, and the island of St Juan on the channel of Mosambique With respect to the Cape of Good Hope, it is certain that the zebu race does not prevail there, at least in the present day; but F Leguat (see his 'Voyages,' &c., 1720) observes that "the oxen are of three sorts at the Cape of Good Hope, all of a large size, and very active; some have a hump on the back, others have the horns long and pendent, while others have them turned up and well shaped, as in English cattle."

With respect to the ox represented on the Greek and Roman sculptures, which is not of the true zebu race, it must be confessed that in many points, and more particularly in the pendulous folded dewlap, it resembled the zebu, and may probably have been the ultimate product of a mixture of the zebu race, introduced at an early date from India, with the ordinary cattle of Greece and Italy This, however, is a mere suggestion. In the Greek sculptures the ox is represented without any hump, but the withers are high and the crupper rounded "To the classical antiquary," says a talented writer, "we beg to suggest that the dewlap of the Brahmin bull offers an object of much attention and interest, by reason of its sharp and decided outline, and perpendicular creases or folds, wonderfully verifying the correctness of those Greek sculptures on bronze and marble, in medals and statuary, in which we see representations of Victory sacrificing a bull, of the oxen of Ceres, &c. These representations will no longer be considered out of drawing by those who may have an opportunity of examining the sacred bull of India, nor exaggerated in their fore-quarters, although critics of the last century (less fortunate in this respect than the visitors of the Zoological Society's gardens) have determined them without hesitation to be altogether incorrect." Several beautiful specimens of the zebu ox, both of the large-sized variety and also of the dwarf caste, are in the Zoological Gardens. They are remarkable for their docility and quiet temper

Mr. Youatt informs us that a beautiful zebu bull and cow of the Nagore breed were exhibited at the Christmas Cattle-show in 1832, and adds, that they were bred by Lieut.-Colonel Skinner, on his farm at Danah near Pukan, on the borders of the Bichaneer desert, a hundred miles to the westward of Delhi They were of the highest breed of Indian cattle, used by the higher orders to draw their state carriages, and much valued for size, speed, and endurance. The specimens in question "arrived at Calcutta, a distance of fourteen hundred miles, in January, 1829, and were then something under six months old. They were sent as a present to Mr Wood, who was then residing at Calcutta, and by whom they were forwarded to Mr Perkins Colonel Skinner has a large stock of them, and six or seven beasts are always kept saddled, to carry the military despatches They remain saddled three or four hours, and if not wanted in that time, fresh ones are brought out to relieve their companions They will travel with a soldier on their back fifteen or sixteen hours in the day, at the rate of six miles an hour Their action is particularly fine, nothing like the English cattle with the sideway circular action of their hind-legs: the Nagore cattle bring their hind-legs under them in as straight a line as the horse They are very active, and can clear a five barred gate with the greatest ease Mr Perkins has a calf which has leaped over an iron fence higher than any five-barred gate, and the bull frequently jumps over the same fence in order to get at the water, and when he has drunk his fill, leaps back again." .. "Mr. Perkins very properly observes, that the chief advantage of these Brahmin bulls would probably consist in their speed and strength, in both of which they surpass any of our breeds '

Of the extensive use and consequent value of the Brahmin or large zebu breed in their native climate, we can scarcely form an adequate idea In some parts of India the dwarf races are unknown, and this is bred exclusively According to an observation of Colonel Sykes, in the 'Proceeds Zool Soc,' the Brinjarees, a singular erratic people, possess vast herds, and breed the Brahmin cattle on an extensive scale, "and an army rarely moves in the field without 15,000 or 20,000 bullocks to carry its grain Dwarf cattle are not met in Dukhun" The buffalo, however, divides the palm of usefulness with the zebu in the agricultural labours of India, and is preferred for many purposes, on account of his more robust constitution. In the Mawals, or hilly tracts among the Ghauts, this animal supersedes the zebu "In those tracts," says Colonel Sykes, "much rice is planted, and the male buffalo, from his superior hardihood, is much better suited to resist the effects of the heavy rains and the splashy cultivation of rice than the bullock The female is also infinitely more valuable than the cow, from the very much greater quantity of milk she yields' In point of beauty and docility there is no comparison between the heavy savage buffalo and the "Sacred bull of Bramah.' Nor is the former ever devoted to Bal-Siva as a meritorious offering On the contrary, it is common to meet with Brahmin bulls thus devoted, which wander at their pleasure, exempt from the servitude of the yoke, and which are regarded as endowed with a sacred character The beautiful form and sleek appearance of these fortunate creatures particularly engaged the notice of Bishop Heber The first which the bishop met in his journey was grazing in a green paddy-field, and was branded on the haunches with the emblem of Siva He crossed their path tame and fearless, and seeing some grass in one of the European's hands, coolly walked up and smelt it. These privileged bulls are turned out when calves, on certain solemn occasions, by wealthy Hindoos, as acceptable offerings to the divinity Siva. To strike or any way injure or molest one of them is held as a mortal sin "They feed,' he observes, "where they choose, and devout persons take great delight in pampering them They are exceeding pests in the villages near Calcutta, breaking into gardens, thrusting their noses into the stalls of fruiterers' and pastry cooks' shops, and helping themselves without ceremony Like other petted animals they are sometimes mischievous, and are said to resent with a push of their horns any delay in gratifying their wishes."*

Between this absurd reverence for consecrated bulls and the ordinary treatment of the working ox there is a vast distinction. the latter is harshly and often severely treated The cow, however, has more forbearance exercised towards her than from the treatment of the ox might be expected. Bishop Heber, speaking of the mode of treading out the corn still practised in India, relates the following:—"One of the Hindoo farmers was threshing out a small kind of millet by driving oxen over it, round and round in a circle. They were just leaving off work as I came up, and a hind was bringing a large bundle of green Indian corn, weeded from the thick crop, for their provender. I observed, however, that the animals, during their previous employment, were not muzzled, according to the Scriptural rule, at the same time they were kept so constantly moving, that a few mouthfuls were all they could get. While I was examining this heap of grain, and asking the old man some questions, his cows came for the evening, and I pleased him exceedingly, when the cowman ran forward to beat them from my path, by forbidding him to strike them. 'Good! good!' he said, with an air of much satisfaction, 'one must not beat cows.' It seems to me that the tender mercies of the Hindoos towards animals are exhausted on cows (and Brahmin bulls) only, for oxen they have no pity—they are treated with much severity * That the ox should be severely treated or employed in hard work by the Brahmins seems a sort of contradiction to the principles by which these people profess to be guided, but such inconsistencies are too common to be surprising.

Thévenot, who describes the zebu oxen of India as excellent both for the saddle and draught, adds that some gallop as fast as a good horse, and goes on to state that they are equally used for the plough and for coaches and chariots They are harnessed by means of a long yoke at the end of the pole which is placed on the neck of the two oxen, and the driver holds in his hand the cord which is attached to a small double cord passed through the gristle of the nose, instead of a bit in the mouth, as in the case of the horse

It would appear that white oxen are highly esteemed in India, as they have also been in other parts of the world Olearius (tome i, p 458) notices the procession of an Indian prince, who was drawn in a carriage by two white oxen, which had the neck short and a hump between the shoulders, but which were as lively and active as horses Bishop Heber observes that the Thakoors, the nobility of the Rajpoots, generally travel in covered waggons drawn by white oxen, whose horns they gild Tavernier observes, "The two oxen which were harnessed to my carriage cost me nearly six hundred rupees The reader need not be astonished at this price, for these are oxen of great strength, and which travel journeys of twelve to fifteen leagues a day for sixty days, and always on the trot. When they have done half their day's work they have two or three balls (the size of a penny loaf) of wheaten flour kneaded with butter and coarse sugar, and in the evening their ordinary fare consists of chickpeas bruised and steeped half an hour in water'

Of the docility, activity, and services of the zebu ox in India much more need not be said. Numerous travellers, both in the past and present century, give the same testimony and record observations bearing upon the same point

Receding westward from India to Persia we gradually lose the zebu race, or at least find it intermingled with that of another type Chardin (vol ii) observes, "The oxen of Persia are like ours, excepting towards the frontiers of India, where they have the hunch on the back Throughout the whole country, the ox is seldom eaten as food; it is only reared as a beast of burden or for tillage. Such as are used for burdens are shod with iron, in consequence of the stony mountains over which they have to travel' The shoeing of oxen, where the country is rugged and the roads hard or stony is also practised in India, as Thévenot relates, but is not a general custom The shoes are light, and two are placed on each foot, as the cloven character of the hoof necessarily requires, so that the natural freedom of each part is not impeded In Persia the bull is often made to fight with the lion, and sometimes comes off victorious, though dreadfully lacerated (Fig. 737)

Thus much respecting the distinction between the zebu race of cattle and the ordinary breeds of Europe, and their apparently natural distribution. Whichever breed or race we contemplate, we shall find it adapted to the service and necessities of man, its value being in proportion It will readily be admitted, however, that the interest which attaches to the ox does not arise from its intelligence, but from its absolute utility, the pleasure which the mind experiences when we gaze on peaceful herds feeding in tranquil security is of a complex origin, the result of an association of ideas more or less remotely connected with the presence of these creatures which, time immemorial, have formed the wealth of man, and which have therefore engaged alike the attention of the statesman, the poet, and the philosopher

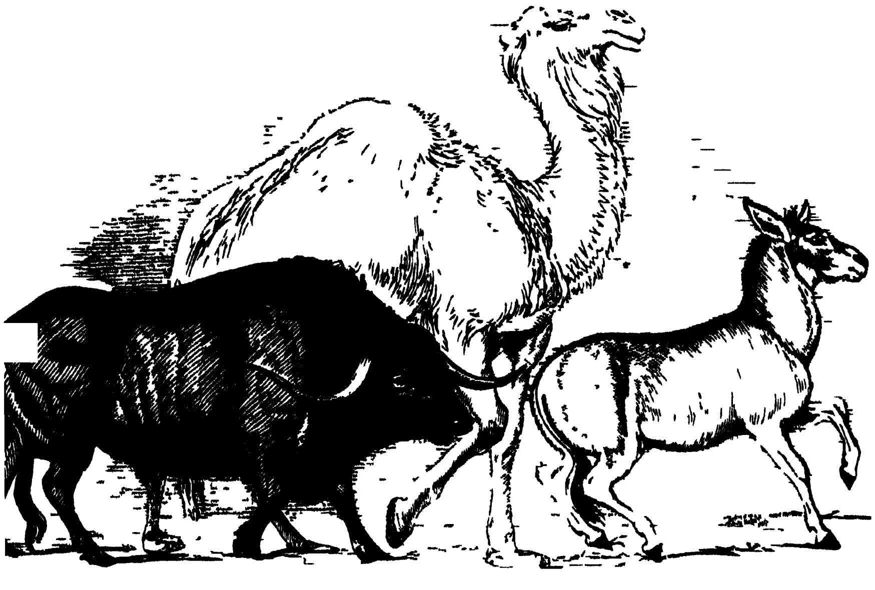
---

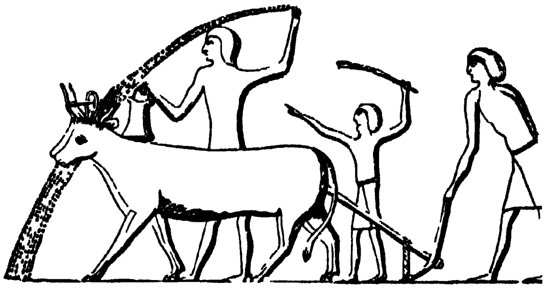
* 'Journey,' vol i, p 145.

* 'Journey,' vol. i., p. 311.

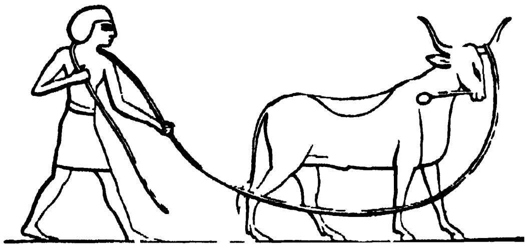
715.—Oriental Threshing with the Sledge

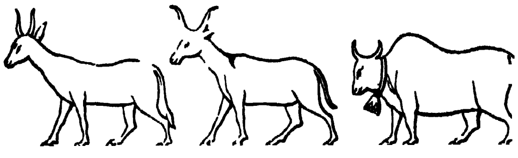
737.—Zebu and Lion fighting

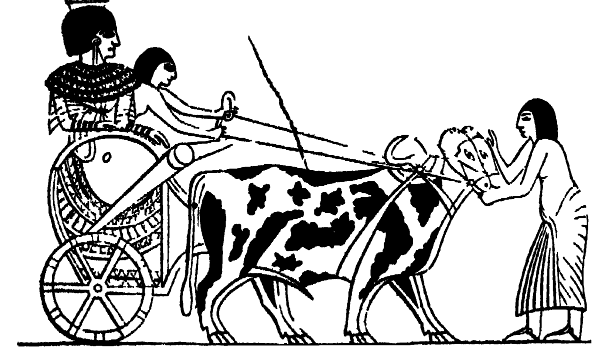

728 Syrian Ox, Camel, and Wild Ass

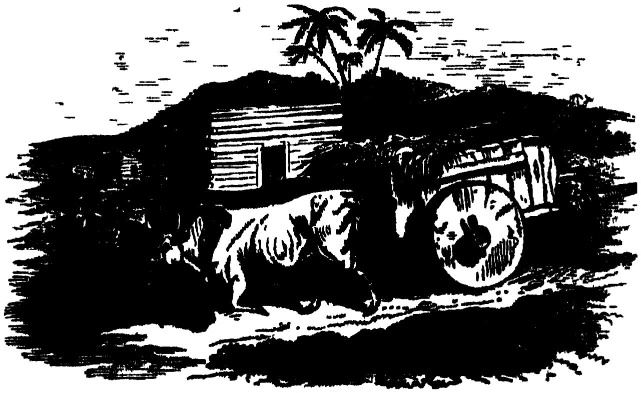

716 —Ancient Egyptian Ploughing

714 —Oriental Threshing with the

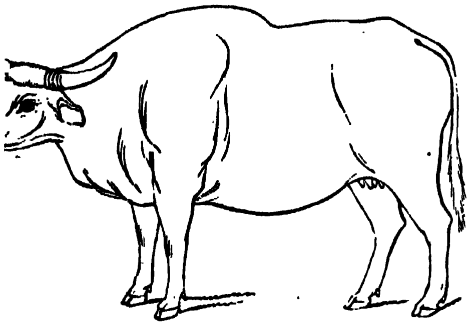

712 —Ox caught in Lasso Egyptian Sculpture.


736.—Oxen, from Egyptian Sculpture.

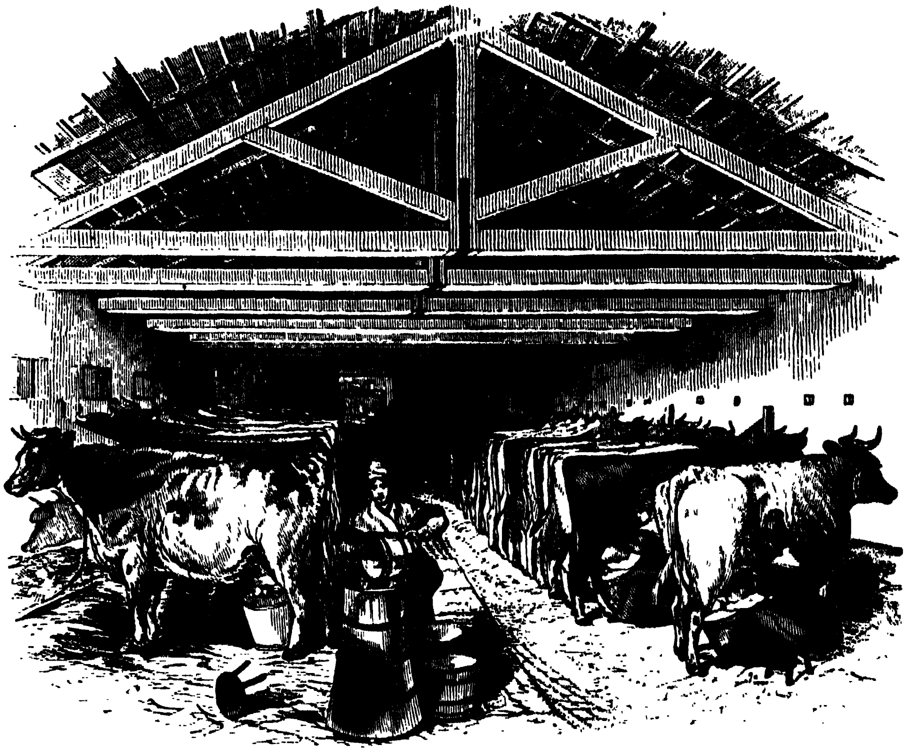

735.—Zebus and Ethiopian Car


736.—Modern Syrian Cart.

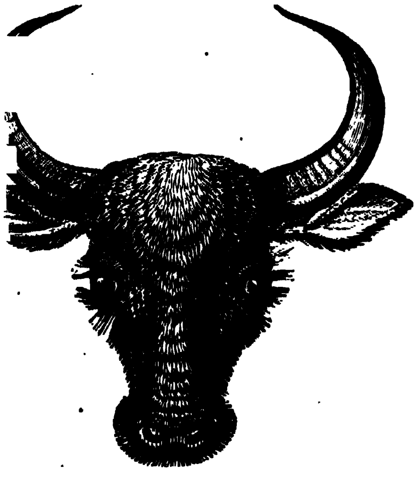
746.—La Botta.



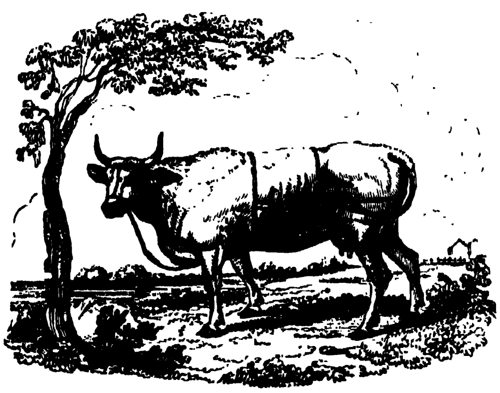
741.—Gayál.



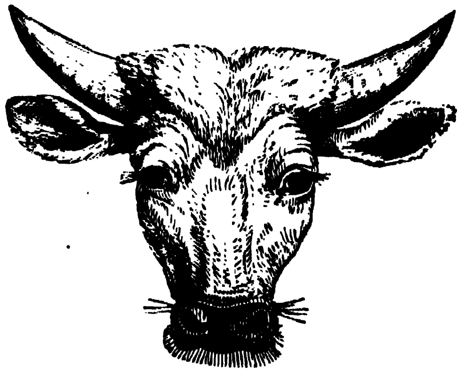
738.—Milking-shed.



742.—Head of Wild Gayál.

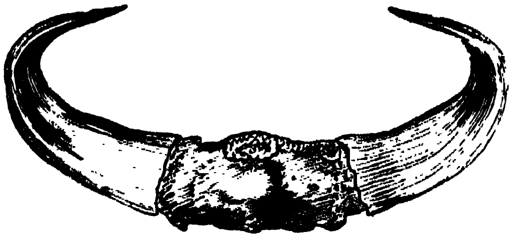


740.—Cow with martingale.

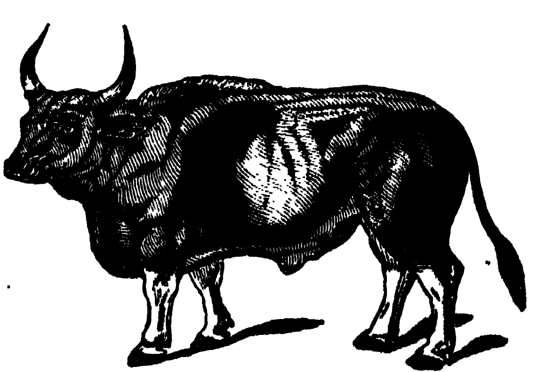


743.—Head of Gyall.

739.—Cattle-layer.



745.—Horns of Gour



744.—Jungly Gau.

Fig. 738 represents a London milking-shed, such as may be seen at Islington, where between 30 and 40 cows are arranged on each side; nothing can exceed the attention to order and cleanliness displayed in the conducting of such establishments for supplying the British metropolis with milk; nor to the treatment and feeding of the animals.

Fig. 739 represents a Cattle-layer, or place erected for the repose of cattle driven from great distances to the Smithfield market; these cattle-layers are principally on the northern outskirts of London, and the grazier or drover agrees with the proprietor of them for a few hours' shelter, rest, and fodder for his drove, for a stipulated but very moderate sum.

Fig. 740 represents the simple but efficient mode adopted in Normandy of preventing the cow, by means of a sort of martingale, from nibbling and breaking down the lower branches of the apple-trees with which the vast cornfields of that district are studded, or which form extensive but unfenced orchards. The apple is there greatly cultivated for the sake of cider, the "bon cidre de Normandie" being greatly celebrated.

(*Bos Gavæus*). Gavaya, Sansc.; Gavaï or Gayâl, Hind.; Gobaygoru, Beng.; Ganjangali, Pers.: Methaná, Mountaineers (Cúcis, &c.) east of Silhet; Shiál, Mountaineers (Cúcis) east of Chatgaon; J'hongnua, Mugs; Núnec, Burmas; Gauvera, Ceylon.

India presents us with several species of wild oxen, independent of such as belong to the buffalo tribe, some of which are domesticated in certain districts, beyond which they are not dispersed; such is the Gayâl. According to Mr. Macrae, the gayâl is found wild in the range of mountains that form the eastern boundary of the provinces of Arracan, Chittagong (Chatgaon), Tipura, and Silhet. The Cúcis, or Lunetas, a people inhabiting the hills immediately to the eastward of Chatgaon, have herds of them in a domesticated state. The animal is called Gabay in the Hindu Sástra, but, as it would appear, is little known beyond the limits of its native mountains, except to the inhabitants of the provinces above mentioned. We learn from the same author that the gayâl is of a dull heavy appearance, but that its form at the same time indicates great strength and activity, like that of the wild buffalo. Its disposition is gentle, and in a wild state on its native hills it is not considered dangerous, never standing the approach of man, much less sustaining his attack. The Cúcis hunt the wild animals for the sake of their flesh. The gâyal is a tenant of the forest, and prefers the tender shoots and leaves of shrubs to grass: it never wallows in the mud like the buffalo. In a state of domestication among the Cúcis, it does not undergo any labour, nor is the milk of the female, which though small in quantity is extremely rich, held in any request: the animals are bred and reared solely for the sake of their flesh and hides, of which latter the Cúcis form strong shields. These domesticated herds roam at large in their forests during the day and return home to their villages in the evening, being taught to do this very early by being fed when young every night with salt, of which these animals are very fond. Though the Cúcis slaughter the domestic gayâl, the Hindus in the province of Chatgaon will not kill this animal (their gabay), which they hold in equal veneration with the cow, but they hunt and kill another gayâl (as l'gàyâl, or Seloï), as they do the wild buffalo.

The cry of the gayâl is a kind of lowing, shriller, but not so loud as that of the European ox, without any resemblance to the grunt of the buffalo.

The gayâl is nearly of the size and shape of the English bull; it has short horns, which are distant at their bases, and rise in a gentle curve upwards and outwards, their transverse section near the base ovate; the forehead is broad, and crowned with a tuft of lighter-coloured, long-curved hair, the dewlap is deep and pendent; there is no mane or hump as in the zebu, but the withers rise to a considerable elevation. The tail is short, the body covered with a tolerable coat of straight dark-brown hair; on the belly it is lighter coloured, and the legs and face are sometimes white. The form of the animal and the way in which it carries its head will be understood from our cut (Fig. 741), which is reduced from that by a native artist, prefixed to Mr. Colebrooke's paper on this species in the 'Asiatic Researches' (vol. viii.).

From various experiments it is proved that the domestic gayâl will breed with the ordinary zebu cattle of India; but whether the offspring will interbreed with each other is yet to be ascertained.

Fig 742 is the head of the true wild gayâl, or, as the natives term it, Aseel Gayâl, from a drawing by General Hardwicke: the specimen was a female from the south-east frontier of Bengal.

743.—The Gyall

(*Bos frontalis*, Lambert). In the seventh volume of the 'Linnæan Transactions' will be found the figure and description of a Gyall (which died in London in 1842), by A. B. Lambert, Esq., who quotes the following letter from George Harris, Esq., this latter gentleman being well acquainted with the domestic gyall in its native country: referring to a communication from Mr. Lambert, he writes, "I have before me your note, with the drawing, which appears to me to be the figure of the animal I mentioned to have in my possession. Some parts of the drawing seem to be rather too much enlarged, as the base of the horns and the rising between the fore shoulders. The animal I described to you, and which I have kept and reared these last seven years, and know by the name of the gyall, is a native of the hills to the north-east and east of the company's province of Chittagong, in Bengal, inhabiting that range of hills which separates it from the country of Arracan. The male gyall is like our bull in shape and appearance, but I conceive not quite so tall, and of a blackish-brown colour; the horns short, but thick and strong towards the base, round which, and across the frons (chaffron), the hair is bushy, and of a dirty white colour. The chest and forehead are broad and thick. He is naturally very bold, and will defend himself against any of the beasts of prey. The female differs little in appearance: her horns are not quite so large, and her make is somewhat more slender; she is very quiet, and used for all the purposes of the dairy, as also (I have been informed by the natives) for tilling the ground, and is more tractable than the buffalo. The milk which these cows give has a peculiar richness in it, arising, I should conceive, from their mode of feeding, which is always on the young shoots and branches of trees, in preference to grass. I constantly made it a practice to allow them to range abroad amongst the hills and jungles at Chittagong during the day to browse, a keeper attending to prevent their straying so far as to endanger losing them. They do not thrive in any part of Bengal so well as in the afore-mentioned province, and in the adjoining one, Tipperah, where I believe the animal is also to be found. I have heard of one instance of a female gyall breeding with a common bull."

Lesson, and the author of the article 'Ox' in the 'Penny Cyclopædia,' seem to regard the gayâl and the gyall as distinct; from the descriptions, however, which are given, it is quite evident that they relate to one and the same species, as Fischer, in his 'Synopsis Mammalium,' considers them to be. The title *frontalis*, therefore, must be retained by right of priority over *Gavæus*. Among the synonyms given by Fischer, are, "Bos Bubalus Gauvera, Pennant, 'Quadr.': Gauvera, Knox, Ceylon: Bantinger Javan, and Bos Sylhetanus, F. Cuvier." The Bos Sylhetanus, the Jungly Ghau, and the Aseel Gayâl, are then identical.

Fig. 744 is a representation of the male Jungly Ghau, or Aseel Gayâl (Bos frontalis, Lambert; Bos Gavæus, Colebrooke; Bos Sylhetanus, F. Cuv.)

Duvaucel, who hunted this animal at the foot of the Silhet Mountains, describes it as very wild, but easily domesticated; he states, that until he had opportunities of seeing it in a state of nature, he entertained the opinion that it did not differ essentially from our domestic ox, his impression being received from an inspection of specimens living tame in the menagerie at Barracpore: subsequently he regarded it as distinct.

745.—The Gour

(*Bos Gour*, Traill, in 'Edinb. Phil. Journ.' Oct. 1824). Of this noble species of wild ox we are able only to give a figure of the horns from a drawing by General Hardwicke. The gour to which they belonged was killed, as General Hardwicke believed, by the same hunting-party described by Capt. Rogers, and the horns were presented to the General by the principal member of that party, the late Major Roughsedge. These horns were fifteen inches between the tips; their colour is horn-grey, with black and solid tips, which are extremely sharp. A fine pair are in the museum of the Zool. Soc. Lond.

According to Capt. Rogers, the gour occurs in several of the mountain-districts of Central India, but is chiefly found in Myn Pât, or Mine Paut, a high insulated mountain, with a tabular summit, in the province of Sergojah, in South Bahar. "This table-land is about thirty-six miles in length, by twenty-four or twenty-five miles in breadth, and rises above the neighbouring plains probably two thousand feet. The sides of the mountain slope with considerable steepness, and are furrowed by streams that water narrow valleys, the verdant banks of which are the favourite haunts of gours. On being disturbed they retreat into the thick jungles of saul-trees which cover the sides of the whole range. The south-east side of the mountain presents an extensive mural precipice from twenty to forty feet high. The rugged slopes at its foot are covered by inpenetrable green jungle, and abound with dens formed of fallen blocks of rocks, the suitable retreat of tigers, bears, and hyænas. The western slopes are less rugged, but the soil is parched and the forests seem withered by excess of heat. The summit of the mountain presents a mixture of opens, lawns, and woods. There were once twenty-five villages on Myn Pât, but these have been long deserted on account of the number and ferocity of the beasts of prey. On this mountain, however, the gour maintains his seat. The Indians assert that even the tiger has no chance in combat with a full-grown gour, though he may occasionally succeed in carrying off an unprotected calf. The wild buffalo abounds in the plains below the mountains, but he so much dreads the gour, according to the natives, that he rarely attempts to invade its haunts, and the hunting-party only met with three or four urnas (arnees) on the mountain. The forests which shield the gour abound, however, with hog-deer, saumurs, (Sambur deer), and porcupines."

It was in these wild and romantic retreats that Capt. Rogers and party hunted the gour, which when wounded turns round upon his adversary, ready to do battle. A short bellow, imitated by the syllables ugh-ugh, was the only cry which the animal was heard to utter, and that not until it had been struck by the bullet. The gour is gregarious, herding together in parties varying from ten to twenty; they browse on the leaves and shoots of tender trees and shrubs, and also graze on the banks of the streams. In cold weather the saul-forests are their places of concealment, and the heats bring them out to feed on the green lawns and valleys. They do not, it seems, wallow in swamp and mire like the buffalo. If the natives are to be credited, the gour will not brook captivity, and even when captured at an early age the mountain-calf droops and dies. The period of gestation is stated to be twelve months: the females produce their young in August. The native name of the bull-calf for the first year is Purórah, of the cow-calf Paréeah. The full-grown cow is termed Goúrin.

The gour attains to a very large size: Dr. Traill gives the dimensions of one not fully grown, which measured from the nose to the end of the tail nearly twelve feet, and stood nearly six feet high at the withers; the limbs are vigorous, clean-made, and more deer-like than bovine; the back is strongly arched, and when the animal stands still the line from the nose to the base of the tail, along the spine presents a nearly uniform curve. This appearance is partly owing to the curved form of the chaffron, and still more to a remarkable ridge of no great thickness which rises six or seven inches above the general line of the back, from the last of the cervical to the middle of the dorsal vertebræ, where it gradually declines and becomes lost. This elevation is very conspicuous in gours of all ages, although they were loaded with fat, and has no resemblance to the hunch found on the withers of the zebu-breed of cattle. There is not a trace of the dewlap, which is well marked in the gayâl. The hair of the skin generally is short and sleek, having somewhat the oily appearance of a fresh seal-skin. The colour is deep brownish black, almost approaching to bluish black; between the horns is a tuft of curling, dirty white hair, and over each hoof is a ring of the same colour.

We may here briefly notice a species of the bovine race, the Yak of Tartary (*Bos grunniens*), too remarkable to be altogether omitted in our sketch of the Ox tribe. Whether the Yak belongs to the restricted genus Bos is very doubtful; in some points it certainly is related to the musk ox (*Ovibos*), at least if we are to judge from the skins, more or less imperfect, which we have had opportunities of examining. The following is the description of a skin wanting the horns and limbs, in the Zoological Museum.

Nostrils narrow, converging below, with a small naked space between them, and a narrow naked border round them, so that there is no true broad naked muzzle, as in the common ox; the ears are small and pointed; the forehead is covered with black, curling locks, but its degree of convexity cannot be accurately determined, owing to the absence of the skull. The back is covered with smooth hair, of a deep chocolate brown, a white stripe occupying the ridge of the withers, and another the centre of the croup. From the shoulders, sides, and under surface of the body, and also from the inside of the thighs, hangs a pendent mane of long hair, falling in huge masses so as to cover the limbs and almost touch the ground. This mane is grizzled black, except a central line along the belly of pure white. The tail is tufted with a huge mass of glossy white and rather coarse hairs, 18 or 20 inches in length. In size the animal could not have exceeded the small Scotch breed of cattle.

On the authority of Gmelin and Turner, the horns are round, small, pointed, and bent in a semicircle forwards. The withers are elevated, and the colour

is said to vary. We have seen an example in which the tail was black.

The yak is a native of the mountains of Thibet, and when wild is said to be savage and dangerous; it is, however, reclaimed, and a domestic breed is kept by the natives of the range tenanted by the animal in its wild condition. The yak is perhaps the Poephagus described by Ælian; from an early period its tail was used as a standard by the Mongols and Tartars, being one of the distinguishing insignia of superior officers. In India these tails are mounted on ivory or silver handles, and, under the name of chowries, are used to brush away the flies; elephants of state are taught to carry a splendidly mounted chowrie in their proboscis, and wave it backwards and forwards.

Of the habits of the yak in a state of freedom little or nothing is known. As regards the domestic yak, Turner, in 'Account of an Embassy to China,' after giving a description of it, observes that "these cattle, though not large-boned, seem, from the profuse quantity of hair with which they are provided, to be of great bulk; they have a downcast heavy look, and appear, what indeed they are, sullen and suspicious, discovering much impatience at the near approach of strangers. They do not *low* loud, like the cattle of England, any more than those of Hindostan, but make a low grunting noise, scarcely audible, and that but seldom, when under some impression of uneasiness. These cattle are pastured in the coldest parts of Thibet upon the short herbage peculiar to the mountains and bleak plains. The chain of mountains situated between the latitudes 27° and 28°, which divides Thibet from Bootan, and whose summits are mostly clothed with snow, is their favourite haunt. In this vicinity the southern glens afford them food and shelter during the severity of winter; in milder seasons the northern aspect is more congenial to their nature, and admits a wider range. They are a very valuable property to the tribes of itinerant Tartars called Duckba, who live in tents, and tend them from place to place; they at the same time afford their herdsmen an easy mode of conveyance, a good covering, and wholesome subsistence. They are never employed in agriculture, but are extremely useful as beasts of burden, for they are strong, sure-footed, and carry a great weight. Tents and ropes are manufactured of their hair, and amongst the humbler ranks of herdsmen I have seen caps and jackets made of their skins. The best requital with which the care of their keepers is at length rewarded for selecting them good pastures, is in the abundant quantity of rich milk which they give, and in the butter produced from it, which is most excellent. It is their custom to preserve this in skins or bladders, and the air being thus excluded from it, it will keep in this cold climate throughout the year; so that after some time tending their herds, when a sufficient store is accumulated, it remains only to load their cattle and drive them to a proper market with their own produce, which constitutes, to the utmost verge of Tartary, a most material article of commerce."

Genus *Anoa*:—

746.—The Anoa

(*Anoa depressicornis*). Our figure represents the iorns of this rare animal, which has been considered y some naturalists as belonging to the antelopes, y others to the Ox tribe; this uncertainty arises rom the circumstance that though the animal has een noticed for many years, only a few fragments f skulls and horns have hitherto been brought to Europe.

The horns are erect, perfectly straight, and in the lane of the forehead; they are about the same ength as the head, that is, about nine or ten inches, trongly depressed or flattened in front, of nearly he same breadth till within three inches of the ex-remities, whence they are rather attenuated to the ps, which are bluntly pointed, and irregularly rinkled, or rather crumbled throughout the greater art of their length. The head is long and narrow, rminating in a broad muzzle.

Mr. Pennant is the first naturalist who has men-oned this animal, but he has given no account of s characters, and merely relates, that it is about e size of a middling sheep, is wild and fierce, and sides in large herds among the rocky mountains the island of Celebes. He considers it as a small ecies of wild buffalo, and adds, that it is cap-red only with great difficulty, and is so fierce in nfinement, that some of these animals, belonging Governor Loten, in one night ripped up the llies of fourteen stags which were kept in the me paddock with them. The next author who ntions the anoa from original documents or per-al observation is Colonel Hamilton Smith, who, **the fourth volume of Griffith's translation of the ègne Animal,' describes the head and horns, and nsiders the animal as a species of antelope. lonel Smith's fragment was brought from Celebes by the late Dr. Clarke Abel, who obtained it on his return from China in the suite of Lord Amherst; but since that period various other heads have been brought to Europe, some of which are deposited in the British Museum and in the collection of the London Zoological Society.**

Genus *Bubalus*:—

747.—The Arnee, or Urna

(*Bos Arni* of Shaw and others). The Arnee is by some naturalists regarded as nothing more than the wild ordinary buffalo; but we are inclined to the opinion that it is a distinct species, as we think is clearly evidenced by the characters of the horns, which are not uncommon in museums, though no specimen of the animal itself exists in Europe. It tenants the high lands of Hindostan, and is known in Bengal and the neighbouring provinces by the name of Arna. It is described as a large and formidable beast, conspicuous for strength, courage, and ferocity. The horns of this animal, which we have figured (Fig. 747), are remarkable for their enormous size, often measuring from four to six feet in length. They rise upwards, first inclining outwards and backwards, and then, arching gradually towards each other as they proceed to the points, form together a bold crescent: they are compressed on their anterior and posterior surfaces, and rough with numerous transverse furrows and ridges. The chaffron is narrow and convex.

748, 749, 750.—The Common Buffalo

(*Bos bubalus*). The Buffalo has been long domesticated in India, where its services as a beast of draught and burden render it extremely valuable. From India it has spread into Egypt, Greece, Italy, and Spain.

The buffalo differs materially in its form and general aspect from the ox, being a heavier and more clumsy animal, as well as more powerful. Though lower in stature than the bull, it is more massive in the body, which is supported on short, thick, solid limbs; the hide is coarse and dense, covered rather sparingly with black wiry hair. The head is large, and carried with the muzzle projecting; the forehead is convex, the muzzle large; the horns are compressed, and lie back, turning up laterally and often attaining to a large size, but the direction seldom allows the points to be used for goring; the ears are large and pendulous; the dewlap is small; the eyes are wild, savage, and malicious in expression; the tail is long and slender.

In its native regions the buffalo is a formidable animal, and capable of contending with the tiger, which is often foiled in the deadly strife. When excited, the beast rushes desperately on its foe, strikes him down with the horns or forehead, kneels upon him, crushing in his chest, and then tramples on the lifeless body, as if to satiate its vindictive fury. Its natural temper, indeed, renders it difficult to tame, and difficult to manage, while its prodigious strength and adaptation for certain localities render it a valuable acquisition. The hot morass teeming with pestilence is the genial abode of the buffalo, and its delight is to wallow in the stagnant water, where it will luxuriate for hours during the heat of the day, with its black muzzle just elevated above the surface. Its flesh is hard and unsavoury, but the milk of the buffalo-cow is of peculiar richness, and in the East a considerable quantity of butter is procured from it. The hide is greatly esteemed for its solidity and toughness. Colonel Sykes states that the long-horned variety of the buffalo is bred in great numbers in the Mawals, or hilly tracts along the Ghauts: "in those tracts much rice is planted, and the male buffalo, from his superior hardihood, is much better suited to resist the effects of the heavy rains and the splashy cultivation of the rice than the bullock. The female is also infinitely more valuable than the cow, from the very much greater quantity of milk she yields."

Dillon states that the buffalo at Malabar is larger than the ox, with white eyes, and flat horns, often two feet long; its legs are thick and short; "It is an ugly animal, almost destitute of hair, goes slowly, but carries very heavy burdens. Herds may be seen, as of common cows, and they afford milk, which serves to make butter and cheese; their flesh is good, though less delicate than that of the ox: the animal swims perfectly well, and traverses the broadest rivers. Besides the tame ones, there are wild buffaloes, which are extremely dangerous, tearing men to pieces, or crushing them with a single blow of the head. **They are less to be dreaded in the woods than elsewhere, because their horns often catch in the branches and give time to the persons pursued to escape by flight. The skin of these animals serves for an infinity of purposes, and even cruses are made of them for holding water or liquors: the animals on the coast of Malabar are almost all wild, and strangers are not prevented from hunting them for their flesh." In Ceylon, as in Malabar, the buffalo exists both in a wild and domesticated state, and the tame herds are not unfrequently joined by wild individuals, which the inhabitants sometimes entrap, and at other times shoot.** Buffaloes, it would appear, are more common in Bombay than in Bengal. At Boitpoor, Bishop Heber was shown a white buffalo, probably an albina, which was pointed out by the Indians as a rare curiosity.

From India the buffalo is distributed throughout Siam, Cochin-China, Malacca, and the adjacent islands, as Sumatra, Java, Borneo, &c., together with the Philippines; it is also common in China, where it is used in the various labours of agriculture.

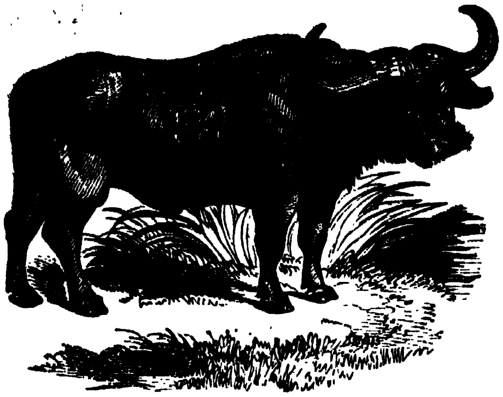
In Africa it is abundant along the Nile, and in other districts, existing in a wild or emancipated state, as well as in a state of domestication. In Abyssinia, more particularly in the forests of Ras el Fil, the buffalo is very common; its skin is chiefly employed in that country for the making of shields, in which considerable art is displayed.

In the middle ages the buffalo was introduced into Spain and Italy, where in course of time the animal became naturalised, and in some districts may be regarded as in a state of nature.

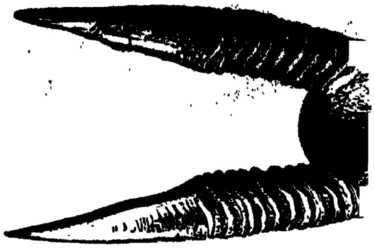
We have already alluded to the Maremma of Italy; in the worst parts of that pestilential tract of country, there the savage buffalo may be seen, roaming at will, under the care of wild keepers, buffalari, whose lives are passed in this dangerous employment. Wherever large herds of buffaloes occur, they may be taken as the sure index of malaria. In the wild provinces of the Calabrias, where most of the plains and valleys are always partially swamped by the Laino, the Chratis, the Amato, and numerous other rivers and torrents, they are very common; they range, almost the only occupants, over the plains of Pæstum, and the still wilder and more extensive flats of Apulia. The Pontine Marshes offer them a favourite retreat, and in the Pestilential Maremme, both of Rome and Tuscany, scarcely any other animals, except wild boars, are ever seen. In northern Italy, where there is infinitely less malaria than in the south, they occur in greatest numbers where the causes of that pest exist, and where its effects are often felt, in the inundated rice-grounds of Lombardy, in the marshes formed by the overflowing of the Po, the Tanaro, the Ticino, or of some other rivers or lakes.

In every part of Italy, but especially in the south, are buffaloes used as beasts of burden, and their strength and perseverance render them available in many emergencies when oxen or horses would fail. In some of the marshy plains of Calabria communication would be almost impracticable were it not for the buffalo. There are not only morasses, swamps, and bogs in every direction, but rivers suddenly swollen to torrents in rainy weather, and unprovided with bridges of any sort, frequently occur. Here horses, mules, or oxen are useless, but a pair of good buffaloes working chest-deep in the mud will, slowly indeed, but surely, drag a large *carro* with its goods or passengers through them. Yoked to a high cart with wheels of prodigious diameter, they will fearlessly take to the swollen torrent, and, provided the water does not entirely cover them, drag it safely to the opposite bank. On the great plain of Apulia the buffalo is the ordinary beast of draught, and at the annual fair held at Foggia at the end of May, immense droves of almost wild buffaloes are brought to the town for sale. Fearful accidents occasionally happen, enraged animals breaking from the dense mass in spite of all the exertions of the buffalari, and rushing upon some object of their vengeance, whom they strike down and trample to death. It is dangerous to over-work or irritate the buffalo, and instances are known in which, when released by the brutal driver from the cart, they have turned instantly upon the man, and killed him before any assistance could be rendered.

The buffalo, as well as the bull, is baited in the amphitheatres of Italy. One kind of sport with the buffalo is called *La Botta*. (Fig. 748.) A large tube made of wicker-work or other flexible materials well wadded without and within, and open at both ends, looking in short like a cask or butt (whence its name) with the ends stove in, is rolled across the arena. Presently a man creeps into this botta, and then lifting it up on end, rises on his feet and begins to move, with his head peeping above the cask towards the buffalo, who at first stares bewildered at the sight, and then runs and upsets the novel object. **In this game the man must be careful, when the charge is made, to draw in his head and legs, and keep himself entirely covered, like a tortoise in his shell. The buffalo seeing that the botta no longer moves, kicks it, butts at it for a while, causing it to roll along, and then leaves it, but presently the cask is again raised on end, and moved by the man**

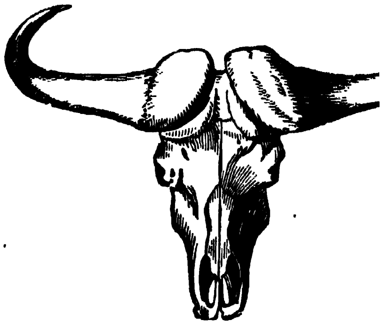


751.—Cape Buffalo.

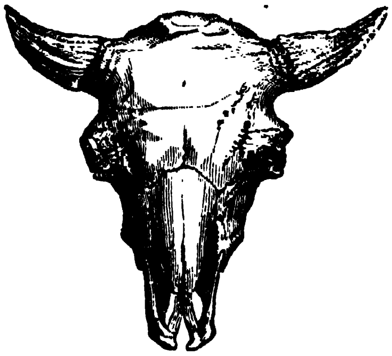


746.—Horns of Anoa.

752.—Cape Buffalo.



753.—Skull of Bos Caffer.

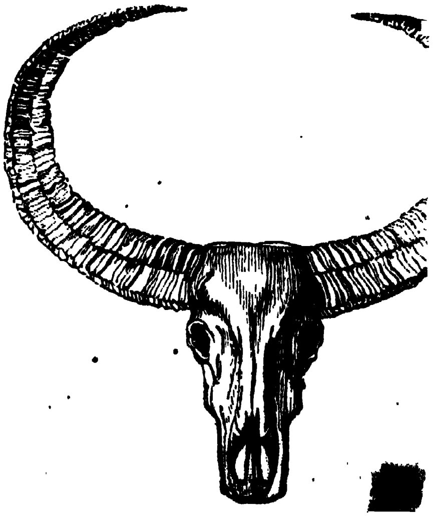


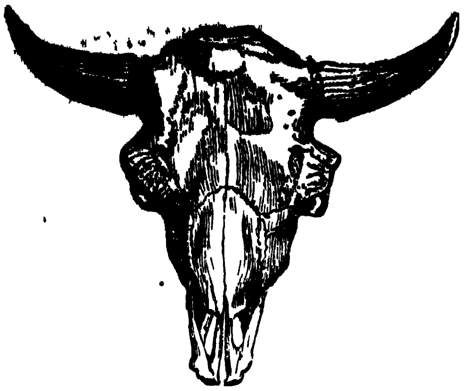
765.

750.—Tiger and Buffalo.

766.

749.—Gleaners of the Pontine Marshes.





754 —Aurochs

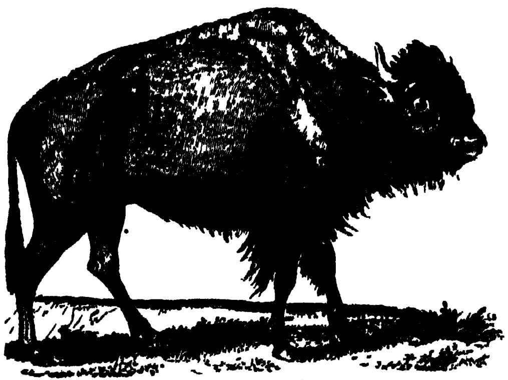
755

758

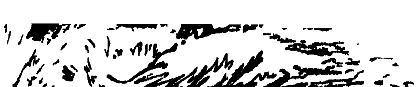
767 —Musk-Ox

759 —American Bison

760 —American Bisons.



762.—American Bison.



towards the beast. This trick could not be played with the Toro Vaccino, whose sharp and strong horns, better placed for attack than the buffalo's, would pierce the cask through and through.

The attack of the buffalo in the arena is more dangerous than that of the bull, and in his rage, when he has missed his tormentor, he often strikes the wall furiously with his head and horns, making fragments of stone fly in all directions, apparently without suffering any injury from the violence of the shocks.

Fig. 749 represents a common scene in the Pontine Marshes—gleaners in harvest-time, returning from work, with their cart drawn by two black, sullen buffaloes, whose red eyes indicate their wild and savage disposition.

751, 759.—THE CAPE BUFFALO.

(*Bos Caffer*). This ferocious animal is a native of Southern Africa, associating generally in troops, frequenting the watered glens and ravines among the hills. Like the common buffalo, it is fond of wallowing in pools or swamps, where it sometimes passes the greater part of the day. Its temper is depicted in its lowering eye, and the malevolent expression of the countenance, to which the position of the horns overshadowing its fiery eyes not a little contributes. These weapons form at their base a solid rugged mass, covering the forehead, from which they bend downwards and somewhat outwards, gradually diminishing to the points, which suddenly curve upwards. The distance between the points of the horns is frequently five feet, but the rugose massive base of each is in contact, forming an impenetrable helmet; their colour is black. The ears are a foot in length, pendent, and in a great measure defended by the horns; yet it is observed that they are always torn and jagged, either from the wounds received in their combats with each other, or from the laceration of thorns and spines, the animals continually forcing their way through the dense thickets. Though not taller than an ordinary ox, the Cape buffalo is a far stouter, heavier, and more powerful beast; its limbs are short and thick, its body bulky, and its head ponderous. The hide is thick and tough, and sparingly covered with harsh blackish hairs, those on the under lip and about the corners of the mouth being elongated so as to form a scanty beard.

Considering the massive proportions of this fierce tenant of the wilds of Southern Africa, it possesses no inconsiderable share of fleetness, and when pursued by the hunter it tears through the thicket and up the mountain-side with surprising impetuosity. Not unfrequently, however, it returns to the attack; so that it is not to be encountered without the utmost caution and the means of escape at hand. Many are the fatal accidents and the narrow escapes from death recorded by the various travellers who have penetrated the country of the Cape buffalo.

The bellowing of the Cape buffalo when wounded, his fury as he tears up the earth with his horns, and his efforts to revenge himself upon his foes before he sinks expiring, are terrific.

It is the general opinion of the natives of South Africa, that though the lion frequently attacks the buffalo, he cannot overcome it by dint of strength, but has recourse to stratagem, lying in ambush near some stream where the beast comes to drink. They say that the lion springs upon its back, drives its tremendous claws into the victim's sides and the nape of the neck, tearing and mangling, till the buffalo falls and dies. At other times they affirm that the lion darts suddenly upon the buffalo, fastens on its chest and neck, lacerating and squeezing the mouth and nose with its fore-paws, till, half suffocated, and exhausted by vain efforts and loss of blood from deep wounds, it expires. The lion, however, does not always make these attacks with impunity, for his carcass is sometimes found gored and trampled, evidently by buffaloes, the herd having come to the rescue of their companion. An allied species (Bos Pegasus, H. Smith) is found in Western Africa.

Fig. 753 represents the skull of the Bos Caffer.

Genus *Bison*:—

754.—THE AUROCHS, OR ZUBR

(*Bison Europæus; Bos urus*, Gmelin). This noble species exists in the great forest of Bialowicza (pronounced Bealawezha in Poland), in Lithuania, where it is protected by stringent laws. In its proportions the aurochs is robust, and its withers are massive and elevated. The largest males stand about six feet high at the shoulders. The hair is of two sorts: one is soft, woolly and short, covering the whole trunk and limbs; the other is long and rough, covering the upper part and sides of the head, the neck, and shoulders, where it forms a mane; under the lower jaw and along the throat to the chest it is lengthened into a sort of beard. In old bulls the mane is often a foot in length, and is thickest in November. The eyes are small, but fierce and sparkling when the animal is irritated. The tongue, lips, and palate are blue. The tail, which is short, is furnished with a tuft of stiff hairs at its extremity. An odour, described as between that of musk and violets, is exhaled from the skin, especially from that part of the skin covering the convexity of the forehead; it is stronger in the male than the female, and may be perceived at the distance of a hundred yards from the herd.

The flesh of this animal is highly esteemed, but when roasted is said to have a bluish tinge.

Thickets near the swampy banks of rivers are the fayourite resorts of the aurouchs; but in summer and during the warmer portion of autumn, according to Dr. Weissenborn, the herds select sandy spots: in winter they keep quiet by day in the thickest part of the fir-wood, only browsing at night, and finding sustenance in the bark of young trees: in spring they visit spots where the herbaceous plants they relish begin to sprout. They are fond of tree-lichens. The voice of the aurochs is a deep short grunt, which may be heard at a considerable distance.

"The strength," says Dr. Weissenborn, "of the zubr is enormous, and trees of five or six inches in diameter cannot withstand the thrusts of old bulls. It is neither afraid of the wolf nor bear, and assails its enemies both with its horns and hoofs. An old zubr is a match for four wolves; packs of the latter animal, however, sometimes hunt down even old bulls when alone, but a herd of zubrs has nothing to fear from any rapacious animal.

"Notwithstanding the great bulk of its body, the zubr can run very swiftly. In galloping its hoofs are raised above its head, which it carries very low.

"The animal has, however, but little bottom, and seldom runs farther than one or two English miles. It swims with great agility, and is very fond of bathing.

"The zubr is generally exceedingly shy, and avoids the approach of man. They can only be approached from the leeward, as their smell is extremely acute. But when accidentally and suddenly fallen in with, they will passionately assail the intruder. In such fits of passion the animal thrusts out its tongue repeatedly, lashes its sides with its tail, and the reddened and sparkling eyes project from their sockets, and roll furiously. Such is their innate wildness, that none of them have ever been completely tamed. When taken young they become, it is true, accustomed to their keepers, but the approach of other persons renders them furious, and even their keepers must be careful always to wear the same sort of dress, when going near them. Their great antipathy to the Bos Taurus, which they either avoid or kill, would render their domestication, if it were practicable, but little desirable. The experiments made with a view of obtaining a mixed breed from the zubr and Bos Taurus have all failed, and are now strictly prohibited."

Figs. 755, 756, represent the skull, in front and profile, of a young aurochs; Figs. 757 and 758, of an old male.

759, 760, 761, 762.—THE AMERICAN BISON

(*Bison Americanus; Bos Americanus*). The American Bison, formerly spread more extensively than at present, still exists in vast numbers in Louisiana, roaming in countless herds over the prairies that are watered by the Arkansas, Platte, Missouri, and upper branches of the Saskatchewan and Peace rivers. Like its congener the aurochs, the American bison is of powerful frame, and exceeds in bulk the ordinary race of cattle, its height at the fore-quarters being upwards of six feet, and its weight from twelve to fifteen hundredweight, and sometimes much more. The head is huge, ponderous, and carried low; the withers are massive and elevated; the eyes are small and their expression is ferocious; the horns are small and black. The neck, withers, and chest are covered with a profusion of long shaggy hair, contributing to render the appearance of the animal wild and terrific; the hinder quarters are clothed with shorter wool. The general colour is umber brown, acquiring a rusty tint in winter. Endowed with the sense of smell in great perfection, wary, and fierce, the bison associates in large herds conducted by one or two old bulls, whose motions the rest appear to follow; but herds of bulls also live separately. Their food consists of grass and rank herbage, to obtain which in winter they scrape away the snow with their feet. On the approach of an enemy the herd immediately takes to flight; but if one be wounded, the life of the hunter is placed in great jeopardy, for turning in a moment, it rushes on its assailant with headlong impetuosity and with determined resolution. Several fatal instances might be cited in which the hunter has perished from want of caution in attacking this formidable beast, and many hairbreadth escapes are on record.

In defending itself from a dog the bison strikes violently with its fore feet, and easily keeps its annoying foe at bay.

The flesh of this animal is accounted excellent, the tongue and hump, or flesh on the top of the withers, being especial delicacies. The chase of the bison is therefore assiduously carried on, both by the natives and the Europeans.

The bison swims well, and during the heats of summer vast herds make their way to shady rivulets, streams, and pools, in which they delight to plunge and bathe. Herds of twenty thousand, crossing rivers upwards of a mile in breadth, have been seen, as Lewis and Clarke inform us, or darkening the plains on their passage to fresh feeding-grounds.

Salt-springs, or saline morasses, or salt-licks, are great attractions to this animal, and at all seasons are visited by numerous herds. These, however, are incessantly thinned by the hunters, and the time is probably not far distant when the American bison will be as rare and as limited in its extent of range as the aurochs of Lithuania.

At certain seasons of the year the bulls engage in terrible conflicts, and rush furiously upon man, or any other animal which ventures near them. With the exception of man the most formidable enemy against which the bison has to contend is the huge grisly bear, and before this dreaded monster the strongest bull goes down.

It appears that the bison will breed with the ordinary race of domestic cattle, against which the aurochs displays the greatest antipathy, though in one respect the latter approaches nearer to the common ox than does the bison; we allude to the number of ribs, which are thirteen in the ox on each side, fourteen in the aurochs, and fifteen in the bison.

Figs. 763, 764, represents the skull, front view and in profile, of a young female bison; Figs. 765, 766, of an old male bison.

Genus *Ovibus*:—

767.—THE MUSK OX

(*Ovibos Moschatus*). The characters of the genus Ovibos, as exhibited by the only known species, are as follows:—The horns are expanded at their base, forming a helmet-like mass, covering the forehead, where their edges are in contact with each other; from this mass they emerge round and tapering, first bending down between the eye and ear, and then sweeping suddenly upwards. The ears and tail are short; the eyes moderate; the nostrils oblong, and inclined to each other from above downwards; there is no true naked muzzle, but a very narrow naked line surrounds each nostril, the rest being covered with hair; there is no furrow in the upper lip.

The musk-ox is a native of the high lattitudes of North America, from the sixty-first to the seventy-fifth degree of latitude. In size it scarcely equals the smallest of the Highland breed of cattle, but appears larger than it really is from the profusion of long matted woolly hair with which it is covered, and which hangs on each side almost to the ground, almost concealing the limbs to the pasterns; the tail is entirely hidden. Beneath the lower jaw, throat, and chest the hair flows full, long and mane-like. The general colour is dull grizzled umber brown, darker on the sides and under surface: on the centre of the back is a brownish-white mark or saddle.

The districts inhabited by the musk-ox, says Dr. Richardson, are the proper lands of the Esquimaux, and their name for it is Oomingmak. It frequents wild and rocky situations, mostly destitute of wood, feeding on grass during one season of the year, and on lichens during the other. When fat its flesh is tolerable, but at certain times both that of the bulls and cows smell strongly of musk. Though the limbs of the musk-ox are short, they are very vigorous, and the animal is fleet and active. Dr. Richardson mentions one pursued on the banks of the Coppermine, which scaled a lofty sand-cliff so steep that the party were obliged to crawl up it on their hands and knees.

In September these animals assemble in herds, and are then much harassed by the hunters. The sport, however, is not free from danger, for the bulls are very irascible, and when wounded will dart furiously upon the hunter, who requires both practice and presence of mind in order to escape. If, however, the hunters remained concealed when they fire upon a herd of musk-oxen, the poor animals mistake the noise for thunder, and forming themselves into a group, crowd nearer and nearer together as their companions fall around them; but should they discover their enemies by sight, or by their sense of smell, which is very acute, the whole herd seek for safety by instant flight.

The wool of this animal is fine, and some stockings which were made from it in France are said to have been equal to those made from silk. If it could be obtained in sufficient quantity, it might doubtless be employed advantageously as an article for manufacture.

ORDER EDENTATA.

Cuv. (*Bruta*, Linn.) This order, which contains the Sloths, the extinct Megatherium and Mylodon, the Armadillo, the Pangolin, and the Ant-eater, appears at a first glance to be less natural than upon careful analysis it is proved to be. Several important links indeed, the absence of which left voids in the chain, have fortunately been recovered, their fossil relics restored, and the species assigned to their true place. In this philosophic labour Professor Owen has rendered to science the most important service, and his work, entitled a 'Description of the Skeleton of an extinct gigantic Sloth, but which is in fact an elaborate analysis of the structure and affinities of the megatheroid quadrupeds in general, is a monument of research and acumen.

With respect to the term Edentata (toothless animals) it must be taken in a qualified sense. The ant-eaters and pangolins are indeed destitute of teeth, but the other genera possess these organs with certain limitations as to number, and of peculiar structure, wanting both the neck part and enamel. Without further preface we may observe that the Edentata resolve themselves into two great sections, namely, *Leaf-eaters* and *Insect* or *Flesh-eaters*. These sections, from their respective habits, have been termed by Desmarest, *Tardigrada*, or slow-paced, and *Effodientia*, or diggers: but to these terms, as they are not universally applicable to the species they include, there are some objections.

I. LEAF-EATERS.

Family Sloths (Tardigrada, Owen; Bradypolidæ Auct.).

Genus *Bradypus*, Linn. (*Acheus*, F. Cuv.)—Claws on the fore-feet, three.

768, 769, 770.—The Common Sloth, or Aï.

(*Bradypus tridactylus*, Linn.). The Sloths are creatures as extraordinary in their habits as in their organization, the one having a mutual relationship to the other. They are exclusively arboreal; the trees afford them at once their needful food and their permanent abiding-place: and for the trees alone are they structurally adapted. It is not long since that the sloth was condemned as a degraded miserable being; slow and embarrassed in all its movements, and wretchedly framed, as if Nature had bungled in its creation. Inconsistent with philosophy, and presumptuous in the extreme, is such an opinion. The tall giraffe and the sinewy-limbed antelope are not more directly organized for their respective requirements, than is the sloth for its appointed place in the scale of creation. Were it a terrestrial animal, then indeed might we call its structure defective; but, its mode of life taken into consideration, we view it in another light, and perceive that it affords a marked example of design and purpose.

Buffon's eloquent misrepresentation of the sloth need not detain us, but we cannot avoid expressing our surprise that the great Cuvier not only quotes the words of that naturalist, but even follows up his ideas. The only excuse is, that the habits of the animals till recently were very imperfectly understood; yet might we not expect that a philosopher would pause before concluding that in the works of nature there occurred exceptions to the laws of harmony by which the whole is governed?

A few observations on the organization of the sloth may not be unacceptable.

Fig. 771 represents the skeleton of the common three-toed sloth; Fig. 772 the pelvis of the same; Fig. 773 the skeleton of the Unau, or two-toed sloth.

In the skeleton of the sloth we are struck at once with the great length of the fore-limbs, which are twice as long as the hinder pair, and with the huge hook-like claws by which all four are terminated: we perceive, too, that the pelvis is bird-like in its conformation and of great breadth, separating the thigh bones to an unusual distance from each other; added to this, the thigh bones are directed obliquely outwards, while the limb from the knee downwards has an inward inclination; and the structure of the wrist and ankle is such, that the palm or sole, instead of being directed to the surface of the ground, as in other animals, is turned inwards towards the body in such a manner as to render it impossible for the sloth to place the sole of its foot straight down on a level surface, but to compel it under such circumstances to rest upon the external edge of the foot (see skeleton, Fig. 771). The hip-joint, as in the orang-outan, is destitute of the ligamentum teres, whence the head of the thigh bone is endowed with greater freedom of motion. In the Aï (three-toed sloth) the neck consists of nine vertebræ, instead of seven, the ordinary number in mammalia, and the two tables of the skull in all the species are separated by large air-cells, so that the small bird-like brain is defended by a double case, a provision against accidental falls, should the branch to which the animal is clinging give way.

Professor Owen observes, respecting the sloths, that "they illustrate the affinity or tendency to the oviparous type, by the supernumerary cervical vertebræ, supporting false ribs, and by the convolution of the windpipe in the thorax, in the three-toed species; by the lacertine (lizard-like) character of three and twenty pairs of ribs in the unau; and by the low cerebral development, by the great tenacity of life, and long-enduring irritability of muscular fibre in both species." The muscles of the sloth are endowed with the most astonishing energy; their force is, indeed, almost incredible, and harmonizes with the arboreal design of the skeleton, of which the limbs alone sufficiently indicate the creature's habits. Who can mistake the meaning of the solid hook-like structure of the paws, or the design of the long arms, or of the security of the union of the clavicle to the large scapula? We might here enter into minute details, but we refrain, only observing that Nature in these points aimed at rigid unyielding strength, and has obtained the result she wished; the long arms of the sloth being thus furnished with strong hooks, which are drawn to the palm (and the same observation applies to the claws of the hind-feet) by means of elastic ligaments it can reach to a distant branch, and there fix itself with facility, or, while clinging to one branch, can draw towards itself another loaded with buds, fruits, or leaves, which offer a grateful repast. Rigid as its paw is, it can use it as a hand, and with great address convey food to its mouth.

Unfitted then for the ground, on which he can only drag himself along by applying the claws of the fore-feet to any rough projection within reach, the sloth is eminently qualified for the branches of the forest, and that rather for their upper than their under surface; clinging to them, he rests and travels suspended, yet in perfect security; here his awkwardness disappears, and he traverses the branches or passes from tree to tree in the dense forest with considerable celerity, either in quest of food, or in order to escape his enemies. Stedman, in his 'History of Surinam,' has an engraving of a sloth in this position, which we have copied as illustrating its singular mode of progression (Fig. 770). But the arms of the sloth are also his weapons of defence, and weapons of no little force: when attacked on the ground, he throws himself on his back, fixes his claws on his adversary, and grasps him with enormous power; in this manner he has been known to strangle a dog, holding him all the while at arm's length, and in this manner he grapples with snakes of large size, to the attacks of which he is said to be subject.

Mr. Burchell (says Professor Buckland, in an interesting paper on these animals in the 'Linn. Trans.' 1835) observed, that "his captive sloths assumed during sleep a position of perfect ease and safety on the fork of a tree, their arms embracing the trunk, their backs resting on the angle of a branch, and their head reclining on their own bosom. The animal is thus rolled up nearly in the form of a ball; the entire vertebral column, including the neck, assumes a nearly circular curve, and not only is the weight of the whole body maintained in an attitude of ease and safety, but the head is supported between the arms and chest, and the face lies buried in the long wool which covers those parts, and is thus protected during sleep from the myriads of insects which would otherwise attack it." According to Mr. Burchell, the buds and young shoots of a species of Cecropia form the principal food of the sloth. These trees grow only in damp places, and rise with a slender stem to the height of thirty or forty feet, giving off horizontal branches, hollow internally, except at the extremities. Along these branches it travels, and the young cling round the body of the mother. It would appear that the moisture of leaves or buds suffices the sloth for drink, as none kept by Mr. Burchell took liquid in any other way. In the aspect of the sloth there is an expression of profound melancholy; it seldom utters any cry; it notices nothing with any positive mark of attention except perhaps the trees to which unerring instinct draws it, nor by any action evinces much intelligence.

The dental system of the sloth is the most simple that can well be conceived. They have no incisor teeth, but canines and molars only; and in the Aï the canines are diminutive, and in all respects very similar to the other teeth. The molar teeth are universally eight in the upper jaw and six in the lower, four and three on either side respectively. Their construction is most simple; they are cylindrical, unrooted, consisting, as Professor Owen has demonstrated, of a centre of vascular dentine surrounded by unvascular dentine or ivory, the whole enveloped by a layer of cœmentum, characterised by numerous minute calciferous cells. Ill fitted for grinding the food, the teeth merely bruise it or break down the tender structure of the buds or leaves, their deficiency in this point being most probably compensated by the singular complication of the stomach, which is sacculated.

The sloths bring forth and suckle their young like ordinary quadrupeds. They have two mammæ, which are situated on the breast; and the young sloth, from the moment of its birth, adheres to the body of its parent till it acquires sufficient size and strength to shift for itself. The head of the Aï is short, the face small and round like that of the American monkeys, the ears concealed in the long hair which surrounds them, the eyes small and deeply sunk in the head, and the tail a mere rudiment. The Indians like its flesh, and are in continual pursuit of it.

Naturalists reckon two distinct species of the Aï, and three or four varieties, some of which may probably be found to be specifically different, when they come to be dissected and carefully compared with one another. 1. The common Aï (Bradypus tridactylus, Linn.) has a short round head, furnished with coarse shaggy hair, disposed on the crown in verging rays, like that of the human species; the face is of a yellowish colour covered with very short hair, whilst that of the body and extremities is universally long and shaggy; the eyes are encircled by a brown ring; the hair of the body varied with irregular patches of dark and light brown, or silvery white: between the shoulders there is an oval patch of short orange-coloured hair, of a finer quality than that found on other parts of the body, and divided in the centre by a longitudinal black stripe: the throat and breast are frequently of a light straw-colour. The texture of the hair is altogether peculiar, and more nearly resembles dry hay, or grass shrivelled and withered by the sun, than the hair of ordinary quadrupeds. It is coarse and flattened at the extremity, but as small at the root as the finest spider's web; and its dry and withered appearance forms the Aï's principal security against its pursuers, as it renders it extremely difficult to detect it whilst at rest among the branches covered with bark and moss of the same colour; it is only when in motion that it can be readily distinguished from the trunk beneath which it hangs suspended. In other respects, different individuals of this species differ considerably from one another, in the shade and disposition of their colours, and in the intensity of the mark between the shoulders; some even want this latter mark altogether, others are of a uniform ash-colour over the whole body, and there are others still, which have the hair of the head parted in the centre, and hanging down upon each side.

Length of the adult about seventeen or eighteen inches.

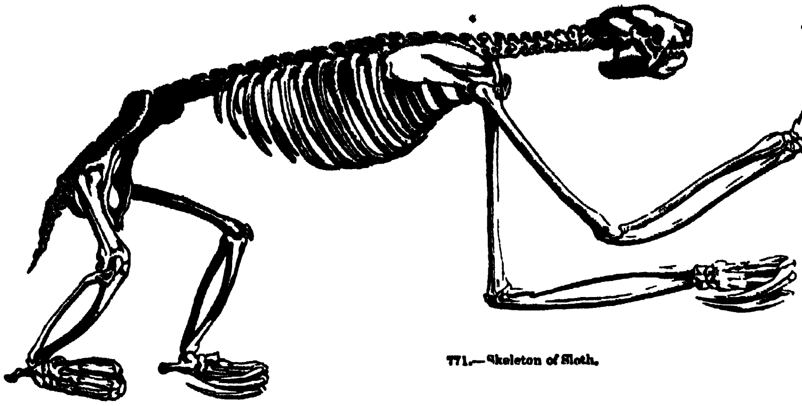
The Collared Aï, (Bradypus collaris,) is a very distinct species, even in the bony structure of its cranium. Its face is naked and of a black colour; the hair of its body less flattened and withered-looking than in the common species; the forehead, temples, chin, throat, and breast covered with reddish or rust-coloured hair, slightly frizzled; on the crown of the head it is long and yellow, and on the rest of the body pale orange: but the most distinguishing mark of the species is a large black collar which completely surrounds the neck, and from which its specific name of *collaris* is derived. Beneath this outer coat there is an inner one of very fine fur, which is of a dark brown colour on the collar, but gradually diminishes in intensity towards the croup, where it is entirely white.

Both these species feed upon the leaves of trees, and bring forth but a single young one at a birth. When in motion in the forests they emit a feeble plaintive cry, resembling the word Aï, and which is the origin of the name they bear among the Europeans settled in America. They are extremely retentive of life, and have been seen to move their legs, and exhibit other symptons of vivacity, a full half-hour after being deprived of the heart and other viscera.

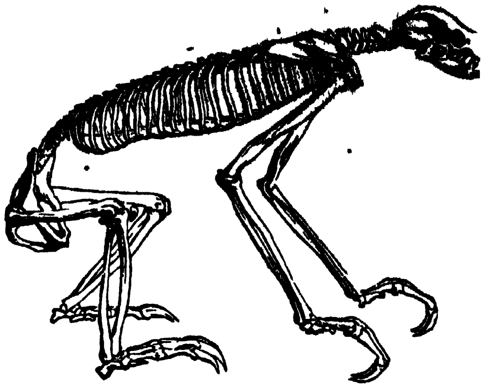
The Unau, or two-toed sloth, of which we figure the skeleton (Fig. 773), is placed by Illiger in a distinct genus, under the title of Cholœpus. It is the Bradypus didactylus of Linnæus. In its manners it closely resembles the Aï, which it exceeds in size.

In both genera the skull is rounded, and the muzzle short, but more especially in the Aïs. The zygomatic arch is very bold and stout, but is incomplete in the centre. The malar bone is very developed, and gives off a descending branch reaching over the lower jaw, but its zygomatic process does not reach the corresponding process of the temporal bone; hence the arch, as we have said, is imperfect. The orbits are nearly circular, but incomplete behind. The lower jaw is large and strong.

In the two-toed sloth there are no pro-dorsal or supernumerary vertebræ in the neck; the feet are far less universally consolidated together.

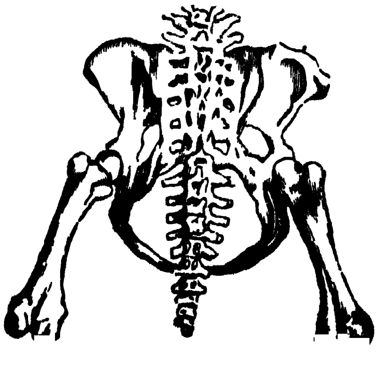


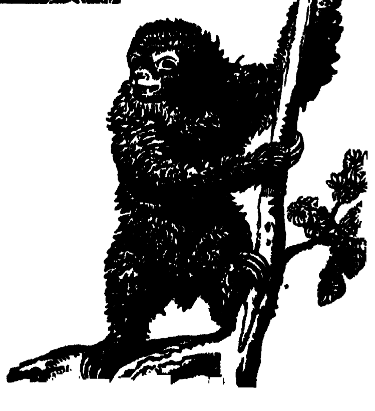
771.—Skeleton of Sloth.

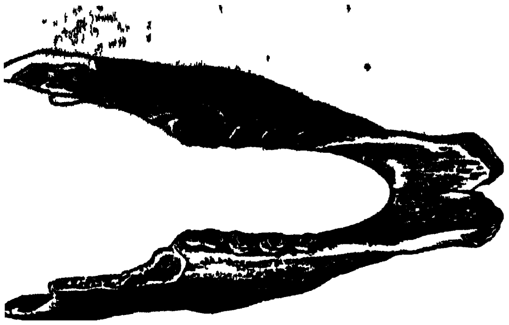


773.—Skeleton of Unau

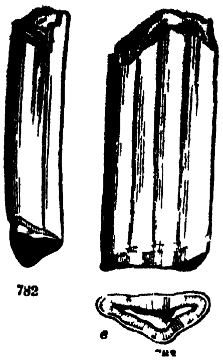
7[illegible]8.—Sloths







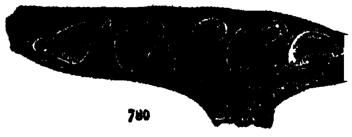
775.—Lower Jaw of Mylodon.



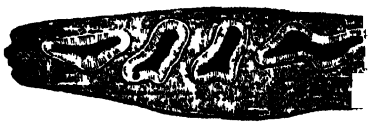
782

6

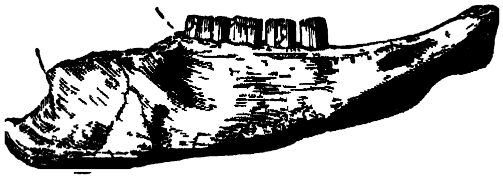
783



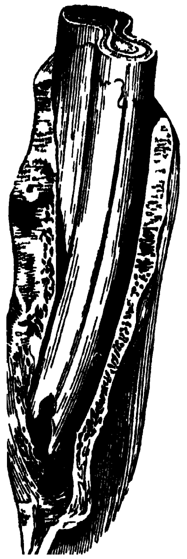
780



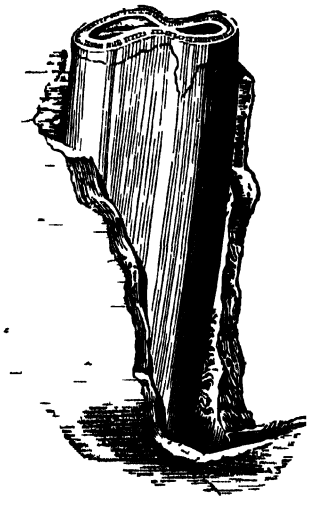
781



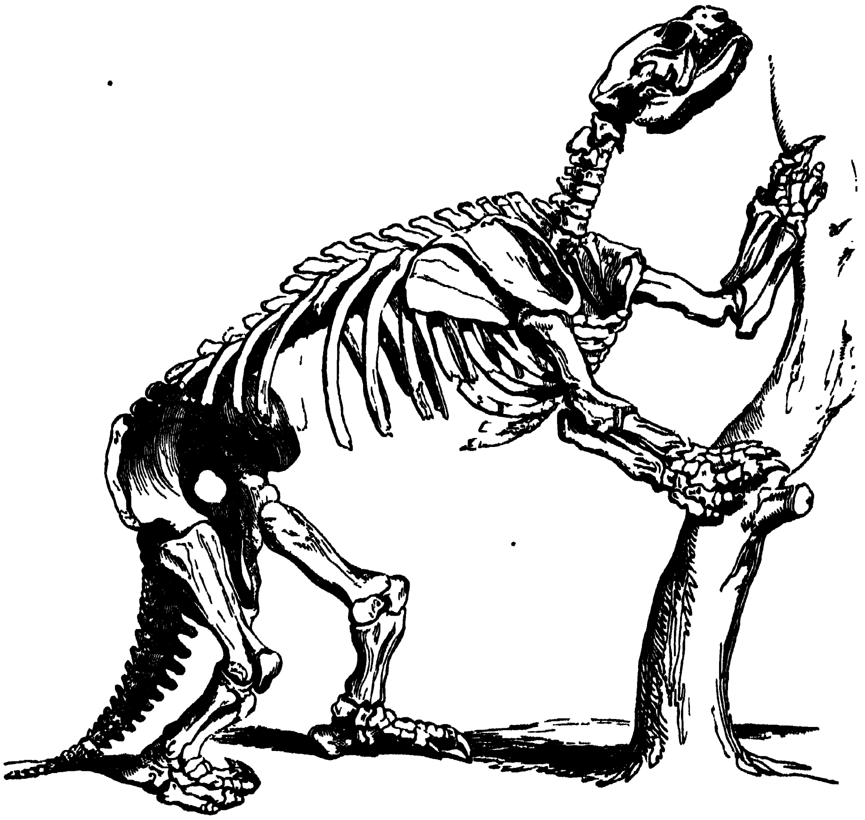
776.—Right branch of the above, external view



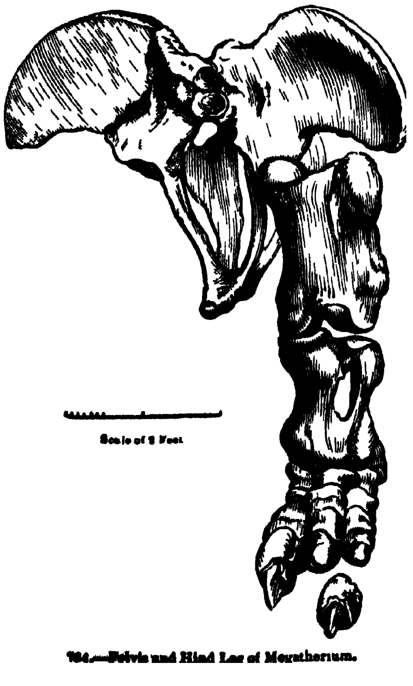
777.—Tooth of Mylodon.



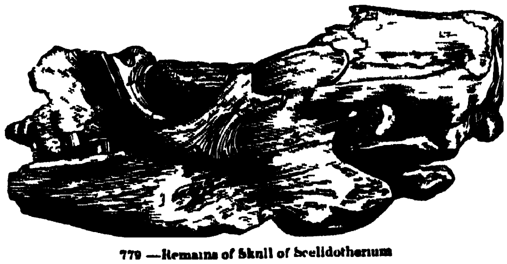
778.—Tooth of Mylodon



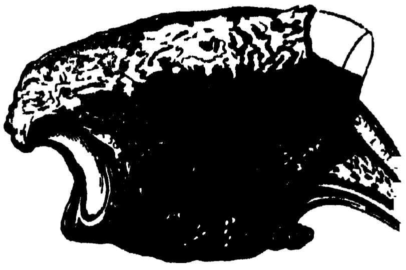
774.—Skeleton of Mylodon robustus.



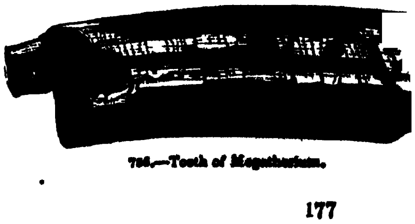
784.—Pelvis and Hind Leg of Megatherium.



779.—Remains of Skull of Scelidotherium



785.—Unguoal Phalanx of Megatherium



786.—Tooth of Megatherium.

Family GRAVIGRADA, Owen.—Feet short, very strong, equal or subequal; fore-feet with five or four toes, of which one or two of the outermost are unarmed, fit for support and progression; the rest are armed with huge claws. Zygomatic arch complete, clavicles perfect; tail moderate or stout, acting as a fulcrum or prop.

Such are the characters of this family, as laid down by Professor Owen. It contains the following genera:—Megalonyx, Megatherium, Mylodon, Scelidotherium, Cœlodon, and Sphenodon; of these genera all the species are extinct, and only known from their fossil relics.

774.—MYLODON ROBUSTUS.

We figure the skeleton of this extinct giant, now preserved in the Royal College of Surgeons, and which, except that it was formed for tearing down the trees of the forest, and not living in their branches, was closely related to the comparatively pigmy sloths of the present day. Conceive of a sloth of the size and bulk of a rhinoceros or hippopotamus, but with bones infinitely more massive, muscles infinitely more voluminous and powerful, with a thick tail acting as a support, and forming with the hind limbs a firm tripod, while the animal thus raised upright, and exerting its enormous strength, sways the tree to and fro, and lays it at last prostrate;—and our reader will have a good idea of what this mighty devastator of the primitive forests of South America must have been.

The skeleton in question was discovered, as we are informed by Professor Owen, "in the year 1841 by M. Pedro de Angelis, seven leagues north of the city of Buenos Ayres, in the fluviatile deposits constituting the extensive plain intersected by the great Rio Plata and its tributaries, and which has been raised during a recent geological epoch above the level of the sea.

"In this formation, and most probably anterior to its elevation, the animal must have been buried entire, and if the present heat of the climate prevailed, soon after its death, for the parts of the skeleton were found little disturbed, and the very few bones that are wanting are such as would be likely to escape the search of the most diligent collector.

"About the same time and near the same place a tessellated osseus carapace of some large quadruped like an armadillo was exhumed, and information of this discovery having been communicated to the Royal College of Surgeons by Sir Woodbine Parish, late Her Majesty's Chargé d'Affaires at Buenos Ayres, both this carapace and the above-mentioned skeleton were purchased by the College. They arrived in November, 1841, in many pieces, fragile from the loss of the animal matter; but having been restored in some measure to their original tenacity, the parts of the carapace were re-united, the skeleton was articulated, and both are now placed in the museum."

We may here observe that the tessellated carapace belongs to a large extinct armadillo, to which the largest living species, the Dasypus Gigas, is but a pigmy; it is termed by Professor Owen, Glyptodon clavipes.

With respect to the fossil genus Mylodon, Professor Owen describes three distinct species, viz., M. Darwinii, M. Harlani, and M. Robustus, which far exceeds the others in size.

We regret that want of space prevents us from following Professor Owen through his elaborate examination of the skeleton of Mylodon robustus, which to the scientific is replete with interest, nor enter into the affinities of the Mylodon to the Megatherium, Megalonyx, and other extinct Edentata, which are rigidly scrutinized.

Fig. 775 represents the lower jaw of Mylodon: Fig. 776, the external view of the right branch of the lower jaw of Mylodon. Figs. 777 and 778, the simple teeth of the Mylodon, showing the depth of their implantation. The cavity at the base of the tooth is seen at *a*, Fig. 777. As in the sloth, the Megatherium, and Megalonyx, these teeth, formed for crushing leaves, are composed of a central pillar of coarse ivory, immediately invested with a thin layer of fine dense ivory, and the whole surrounded with a thick coating of cement.

From the structure of these teeth it is evident that the Mylodon fed on leaves, like the sloths of the present day. But, notwithstanding Dr. Lund's opinion, it was certainly not adapted for climbing trees; besides, what trees could bear its weight? How then did it obtain its food? The whole of its osseous confirmation suggests the answer—it was formed to uprend the trees that bore its sustenance. The enormous expanse of the pelvis, the great bulk and strength of the hind-legs, the solidity of the tail, to which its evidently vast muscles were attached, enabling it with the hind-limbs to complete a firm tripod of support, the proportions of the fore-limbs, unequalled for massiveness by those of any existing or extinct animal, the size and strength of its claws,—in short the whole mechanism of the colossal frame becomes intelligible only on the ground of the herculean labour to which the animal was appointed. Perhaps it commenced the process of prostrating the chosen tree by scratching away the soil from the roots, and then proceeded to grapple with it thus partially undermined, and apply the surpassing strength of its limbs and body, the muscles of the trunk and extremities, being animated by the influence of the unusually large spinal chord.

It may here be stated that the skull of the specimen described by Professor Owen had at some time or other been fractured and had healed; the animal living long afterwards: and it will at once occur to the reader that these animals must have been unusually liable, from their habits, to blows from heavy falling bodies; to meet such accidents the scull was peculiarly constructed, its outer and inner table being separated by extensive air-cells, so that the fracture of the outer table might occur without injury to the brain. It was by virtue of this structure that the subject of the Professor's memoir appears to have been saved.

779, 780, 781, 782, 783.—SCELIDOTHERIUM.

Our Figures represent (Fig. 779) the remains of the skull; Figs. 780, 781, the dentition of an extinct animal, to which Professor Owen has given the title of Scelidotherium. Figs. 782, 783, show the depth of the implantation of the teeth and their structure; *e*, the crown of a tooth seen from above.

This animal was evidently allied to the Mylodon and Megatherium, and belongs to the same family.

The fossil remains, viz., a cranium, several vertebræ, the scapulæ, and various bones of the limbs, were discovered by Mr. Darwin at Punta Alta, in northern Patagonia, and in the same bed of partly consolidated gravel as that wherein the lower jaws of Toxodon and a species of Mylodon were imbedded. All the parts were discovered in their natural relative position, indicating, as Mr. Darwin observes, that the sublittoral formation in which they had been originally deposited had been but little disturbed. This beach is covered at spring-tides, and many portions of the skeleton were encrusted with *flustræ*. Small marine shells were lodged within the crevices of the bones.

The teeth in structure resemble those of the Mylodon; there are neither incisors nor canines; the molars are five on each side above, and four below. According to Professor Owen, the Cape Ant-eater, or Aard-vark, of all the Edentata most nearly resembles the Scelidotherium in the form of the skull; and next to the Aard-vark may be cited the great Armadillo (*Dasypus Gigas*).

"Although the Scelidothere, like most other Edentals, was of low stature, and, like the Megatherium, presented a disproportionate development of the hinder parts, it is probable that bulk for bulk, it equalled, when alive, the largest existing Pachyderms not proboscidean. There is no evidence that it possessed a tessellated osseous coat of mail."

784, 785, 786, 787, 788, 789.—THE MEGATHERIUM.

The relics of this colossal beast, of which Figs. 787, 788, and 789 represent the skeleton, have been discovered only in South America, of which continent, at some remote period, it was an inhabitant.

The affinity of this animal to the sloths and other Edentata was pointed out by Cuvier, but many points required elucidation; in fact zoologists have been led, not without apparent grounds, into some errors, recently corrected.

For a long time the museum of Madrid afforded the only relics of the Megatherium in Europe; but the skeleton they compose is deficient in several of its parts; fortunately the recent acquisition by the Royal College of Surgeons of a great portion of the bones of this animal has tended to supply the defects, at least to a considerable extent.

These splendid and valuable remains form the subject of an interesting paper from the pen of Mr. Clift, in the third vol., p. 3, of the 'Trans. Geol. Soc. Lond.' accompanied by an improved figure of the skeleton, and figures of various detached parts, together with a map of that part of the province of Buenos Ayres in which the places where the bones in question were found, and also those of the Madrid specimen, are marked down.

The acquisition of these remains by the Royal College of Surgeons is due to the zeal and liberality of Woodbine Parish, Esq. "They were found in the river Salado, which runs through the flat alluvial plains to the south of the city of Buenos Ayres. Their discovery was owing to a succession of unusually dry seasons in the three preceding years, which lowered the waters in an extraordinary degree, and exposed part of the pelvis to view as it stood upright in the bottom of the river. It appears that this and some other parts of the skeleton, having been carried to Buenos Ayres by the country-people, were very liberally placed at Mr. Parish's disposal by Don Hilario Sosa, the owner of the property on which they were found. In the hope of obtaining the other parts of the skeleton, an intelligent person was subsequently sent to the same spot, who succeeded, after considerable difficulties, in getting out of the mud forming the bed of the river the remainder of the collection. Further inquiry led Mr. Parish to suppose that similar remains might be met with in other parts of the provinces of Buenos Ayres, and he applied to the local authorities to assist him in making further search. This was given by the governor, Don Manual Rosas, and the remains of the two other skeletons were found on his excellency's own properties of Las Averias and Villanueva, one to the north, the other to the south of the Salado, but at no great distance from the place where the first had been discovered. In the latter instance the osseous remains were accompanied by an immense shell, or case, portions of which were brought to this country." A fragment of this shell, or osseous shield, is figured by Mr. Clift; its external surface is rough, and it appears to consist of an assemblage of smaller parts, like rosettes in sculpture, united together by suture; the sutures being plainly marked on the under surface, which is smooth. By M. Blainville, Dr. Buckland, and indeed by most naturalists, this buckler or carapace was regarded as belonging to the Megatherium, whose colossal bulk it was regarded as having protected, as is the case in the Armadillos, to which it was believed to be closely related, not only in structure and habits, but also food.

It has, however, been recently demonstrated by Professor Owen, and we believe to the entire satisfaction of Dr. Buckland himself, that the tessellated carapace found with the Salado remains did not belong to the Megatherium, but to a large armadillo-like animal, to which Professor Owen assigned the title of Glyptodon, and whose hind-feet, like the fore-foot, appear to be so modified as to form the bases of columnar limbs destined to support an enormous incumbent weight. Moreover, from a rigorous examination of the details of the skeleton of the Megatherium, into which we forbear to enter, he proves the incompatibility of such a shield with its osseous structure, which differs in marked essentials from that of the Armadillo, in which latter animal the skeleton is expressly modified for the armour which covers the back and head.

In his paper on the Glyptodon, wherein the claims of the Megatherium to this armour are discussed, Professor Owen gives a tabular account of the discovery of twelve skeletons of the Megatherium, and in no instance did any portion of bony armour occur with or near the bone; and in a note the writer of the article 'Megatherium' in the 'Penny Cyclopædia' states as follows:—

"Sir Woodbine Parish has just now (May 29, 1839) kindly communicated to us a letter received by him, giving information of the discovery of an almost entire skeleton of an adult Megatherium on the banks of the Rio de la Matanza, with all the vertebræ of the body, all the ribs, all the teeth, the head and the legs, in short, with the whole of the bones except the tail and one foot. Close to it was the skeleton of a 'Tatou gigantesque' (Glyptodon probably), with its bony armour complete. There was also found a very small and perfect Megatherium, which must have been only just born at the epoch of destruction. No mention is made of any traces of bony armour or shell about the Megatheria. In the old animal only one foot is wanting. It has been suggested that the so-called young Megatherium may possibly be a skeleton of Scelidotherium."

It is then to the armadillo-like Glyptodon, and not to the Megatherium, that the strong bony armour belongs; of this latter animal relics have been found on the left bank of the Pedernal, near Monte Video, and are preserved in the Museum of that town. Portions of bony armour also have been obtained in the Rio Seco and Banda Oriental, similar in structure to the specimen of the Pedernal.

"The collection of fossils," says Professor Owen, "brought to England from South America by Mr. Darwin, has enabled me to add the following facts to the history of the Megatherium. Its teeth, for example, do not differ in number from those of the sloths, there being five on each side of the upper jaw. Microscopic examination having demonstrated a marked difference in the intimate structure of the teeth of the sloths and armadillos, I have ascertained by this mode of investigation that the teeth of the Megatherium have the same texture and composition as those of the sloth. And if from identity of dental structure in two different animals we may predicate a similarity in their food, a glance at the bony framework of the Megatherium is sufficient to show that it must have resorted to other means of obtaining its leafy provender than that of climbing for it, whereby the necessity of inferring a proportionate magnitude of the trees which nourished the Megatherium is obviated." It would appear that, like the Mylodon, the Megatherium uprooted the trees, on the leaves of which it fed, and was furnished with a small proboscis as an adjunct to the tongue in stripping off the smaller branches of the prostrate tree; its skull, moreover, has the two tables separated by cells, as in the Mylodon. Fig. 784 represents the pelvis and hind-leg of the Megatherium in the Royal College of Surgeons; Fig. 785, the ungueal phalanx; Fig. 786, the teeth of Megatherium.

With respect to the Megalonyx, it was an animal closely related to the Megatherium, and doubtless of the same habits, but of inferior size, not exceeding the size of an ox, though more solidly and heavily built. Its relics are apparently more rare than those of the Magatherium, at least fewer have been recovered.

II. INSECTIVOROUS EDENTATA.

Family **Loricata**, or **Armadillos**.—This family group includes the true armadillos (*Dasypus*), the Chlamyphorus, and also the Aard-vark, or African Ant eater, which, though not covered with armour, approaches in its structure nearer to the armadillos than to the American ant-eaters (*Myrmecophaga*), with which animals it was formerly associated, and which it resembles very closely in manners and food.

The Armadillos (*Dasypus*) are divided by Cuvier into five minor groups, or subgenera, according to number of the teeth and fore-claws; viz., Cachichames, Apars, Encouberts, Cabassous, and Priodontes.

The Cachichames have four toes on each foot, and seven teeth on each side above and below. The Apars have four toes on each foot, and nine or ten teeth in each side in both jaws. The Encouberts have five toes on the fore-feet, and nine or ten teeth on each side above and below, with two incisor teeth in the upper. The Cabassous have five toes, but those of the fore feet are disposed obliquely, and in such a manner that the thumb and index finger are small, the middle and fourth toes armed with tremendously large trenchant claws, and the fifth very small: teeth nine or ten on each side above and below The Priodontes, in addition to the unequal toes and enormous claws of the Cabassous, have from twenty-two to twenty-four small teeth on each side in each jaw.

The Armadillos are exclusively confined to the warmer portions of the American continent, and the species are tolerably numerous, none, however, attaining to a very large size excepting the Dasypus Gigas, which itself is but a pigmy to the extinct Glyptodon.

These animals are burrowing in their habits, with thick, short, powerful limbs, and a flattened broad, stout body, covered above with plates and bands of horny armour. The head is broad between the eyes, whence it runs to a pointed muzzle, the mouth is small, the teeth are cylindrical, feeble, destitute of true roots, set apart from each other, and mutually fit, when the jaws are closed, into the intervals. The tongue is smooth, slender, and moderately extensible; it is most probably endowed with the sense of taste in a high degree, as we have observed especially in one species, the Dasypus Peba, the animal touched with it whatever was presented by way of food; and we know that it is lubricated abundantly with a glutinous fluid, poured out chiefly from the submaxillary gland. (See 'Zool. Proceeds.' for 1831, p. 144.)

The portions of armour which cover these animals consist of a triangular or oval plate on the top of the head, or rather on the chaffron, its posterior margin projecting over the neck; a large buckler over the shoulders, and a similar buckler over the haunches, while between these solid portions there intervenes a series of transverse bands overlapping each other's edges, and allowing to the body due freedom of motion. Each of these separate portions consists of a multitude of small parts, all consolidated together, giving the idea of what is termed mosaic-work, especially on the head and shoulders, the pattern differing in different species. The limbs, which are short and thick, are almost entirely concealed by the edges of this armour, but the feet, which are unprotected by it, are covered by a hard tuberculated skin. The tail is covered with a series of calcareous rings; the skin of the under surface of the body is very rough and beset with long scattered hairs; and from between the joints of the rings and plates of the dorsal armour there issue hairs of the same kind, more numerous in young than adult individuals. In some species, however, as the Mataco (Dasypus Apar), whose armour is peculiarly thick and solid, no hair is to be discovered.

The eyes of the Armadillos are small and lateral; the ears, varying in size in the different species, are firm, and covered with tuberculated skin. Most of the species are nocturnal in their habits, remaining concealed in their burrows during the day; these are of considerable extent, dipping at an inclination of about 45 degrees; they have one or two sharp turns, and very narrow, just admitting the passage of their occupier. The animals make these burrows with great expedition, and can only be forced out by smoke or water; such is their strength and the tenacity of their hold, that they have been known to leave their tail in the hands of the hunter, on his attempt to drag them forth.

When alarmed during their excursions, the first endeavour of these animals is to gain their burrows, to which they run with a degree of celerity little to be expected from their clumsy appearance. Most of the species will easily outstrip a man; their movements, however, resemble those produced by mechanism, for as the spinous processes of the vertebral column are all inclined the same way, viz., towards the tail, there being no central points to which those of the upper and those of the lower portion mutually converge, so the motions of the limbs are unaccompanied by corresponding inflexions of this column, as is the case in other animals whose progressive motions are free and unconstrained.

When hard pressed and unable to gain their burrow, they either attempt to dig a temporary place of refuge, or they gather up their limbs beneath their coat of mail, bend down their head, assume a partially rolled-up figure, and wait the event. The mataco, which does not burrow, and is by no means swift, can roll itself up completely. They never attempt to bite or otherwise defend themselves. The food of the armadillos consists principally of fallen fruits, roots, and worms; but they do not reject carrion, and have been known to penetrate into graves, when not properly protected by stones or brick-work. Azara informs us that ants are never found in the districts inhabited by the armadillos, and that these animals break into the ant-hills, and devour the insects as greedily as the true ant eaters. Nature, it is true, has not provided them with the same apparatus for this purpose, but the armadillos may, notwithstanding, destroy vast quantities of ants, though it is probable that they expel them from their own peculiar districts as much at least by destroying the habitations as by actually devouring the insects themselves The ordinary food of the armadillos consists chiefly of the roots of the manioc, of potatoes, maize, and other similar substances of a vegetable nature, though, as already observed, without rejecting animal substances naturally soft or so far decomposed as to be easily torn without the help of canine teeth. They are also very destructive to the eggs and young of such birds as build their nests on the ground, and greedily devour worms, frogs, small lizards, and M. Azara says, even vipers. The chief animal food of the armadillos, however, is derived from the immense herds of wild cattle which cover the plains and savannas of every part of South America These are rarely slaughtered but for the sake of the hide and tallow, and as the carcases are left to rot on the pampas, or plains, the smell soon attracts vast crowds of carnivorous animals of various species, and among others, great numbers of armadillos, which greedily devour the half putrid flesh, and soon become extremely fat and corpulent. In this condition, notwithstanding the filthy nature of their food, their flesh is esteemed a great delicacy, both by the native Indians and by the Portuguese and Spaniards of America. The animal is roasted in its shell, and considered one of the greatest dainties which the country produces

The armadillos see but indifferently, particularly in bright sunshiny weather, but their sense of hearing is extremely acute, and amply compensates for any imperfection of sight. When alarmed by any unusual or strange sound, they prick up their ears, stop for a moment to satisfy themselves of its distance and direction, then commence a precipitate retreat to their burrow, or, if that be too remote, begin to construct a new one. Smell is, however, by far the most acute of their senses.

It is generally believed that the female armadillo brings forth but once during the year, but she produces at a birth frequently six, eight, or even ten young ones; yet she has never more than four teats, and, according to the report of M Azara, the most accurate and extensive observer who has written upon the history of these animals, in some species only two—an anomaly, with respect to the number of young and the number of teats, which appears to contradict the general rule observable among other mammals.

It may here be observed that one of the weasel-headed armadillos (D Encoubert) in the Zoological Gardens, produced only two at a birth: when first born they were quite blind, about four inches in length, soft, and white, but the skin presented all the furrows and mosaic-work which characterize it when indurated and solid. The growth of these animals was not a little surprising; in six or eight weeks they attained nearly to the size of their parents. One born on the 3rd of September, 1831, and which died on the 16th of November of the same year, had increased in weight during that short period 52 ounces 2 drams, and measured 11½ inches from the nose to the root of the tail. The young are far more hairy than the adults.

790.—The Peba.

(*Dasypus Peba*). The Tatouhou, or Black Tatu, of the Guaranis, is an example of Cuvier's group of Cachichames, which, according to Gumilla, is the general name of the Armadillos on the banks of the Orinoco. In zoological catalogues we find it under the ambiguous names of Dasypus septemcinctus, D. octocinctus, and D. novemcinctus; three different species being thus made out from the erroneous supposition that the number of moveable bands on the back was invariabla in the same species: whereas the truth is that the number of bands is subject to a certain degree of variation; thus in the Mule Armadillo there are six or seven bands, in the Peba from six to nine It appears also that the young have not the full complement of bands, by one or two which become developed afterwards. The Peba is a native of Guiana, Brazil, and Paraguay, and is timid and nocturnal, it is tolerably rapid in its movements, and very expert in burrowing.

It is never found in woods, but frequents the open and cultivated plains, and is much hunted by the inhabitants on account of its flesh, which, when roasted in the shell, is said to be extremely delicate, resembling that of a sucking-pig.

The length of the head and body is about sixteen inches; of the tail, which is slender and tapering fourteen inches. The muzzle is greatly elongated, straight, and pointed; the ears are rather large and the eyes small, the tongue long, narrow, pointed, and extensible The general colour of the shell is dusky black.

Allied to the Peba is the Mule Armadillo (Dasypus hybridus, Desm.), called M. Couigua, or Mule Tatu, by the Guaranis, in allusion to its long upright ears. It is of smaller size than the Peba, and its tail is comparatively shorter. It wanders by day over the plains, feeding on beetles, larvæ, roots, &c; differing from the Peba in being diurnal in its habits. It is common on the Pampas of Buenos Ayres.

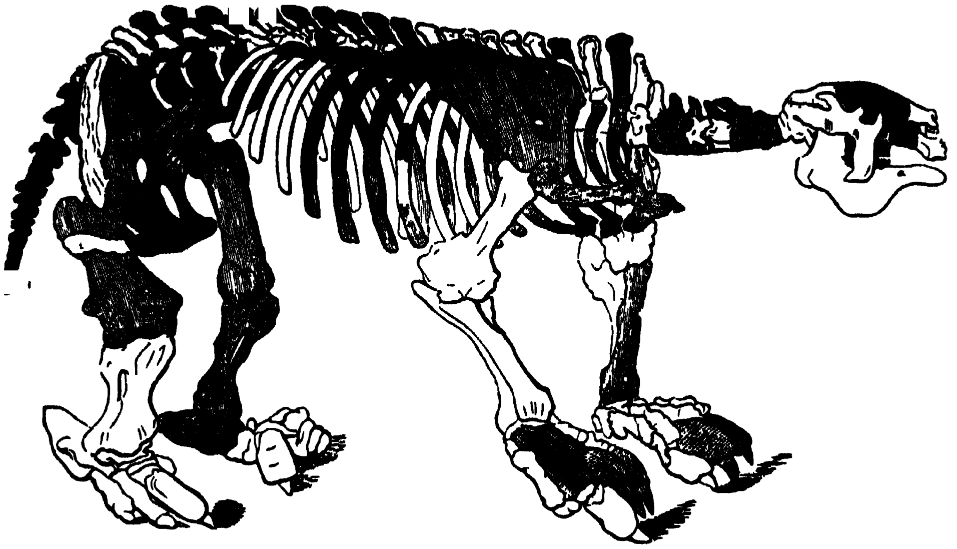
791.—The Mataco.

(*Dasypus Apar*) This species is an example of Cuvier's group of Apars. The Mataco, or Bolita (little ball) as it is sometimes called, has its shell of defence extremely hard and solid, forming an admirable coat of mail It has only three bands on the back. Of all the Armadillos, the Mataco is the only one which can assume the complete figure of a ball, enclosing the head and legs; and this faculty, together with the strength of the skull, appears the more necessary, as it does not burrow, its limbs being feeble, and its claws little adapted for scratching up the ground. It is diurnal in its habits, and slow in its movements. It is a native of the Pampas of Buenos Ayres, the tail is short, not much exceeding two inches in length, while the head and body measure nearly fifteen inches. Rolled up in its tessellated shell, it is safe from the attacks of dogs; "For the dog," says Mr Darwin, "not being able to take the whole in its mouth, tries to bite one side, and the ball slips away. The smooth hard covering of the Mataco offers a better defence than the sharp spines of the hedgehog." A shell of this species, which formed the cup of a cacique, is in the Mus Zool. Soc.

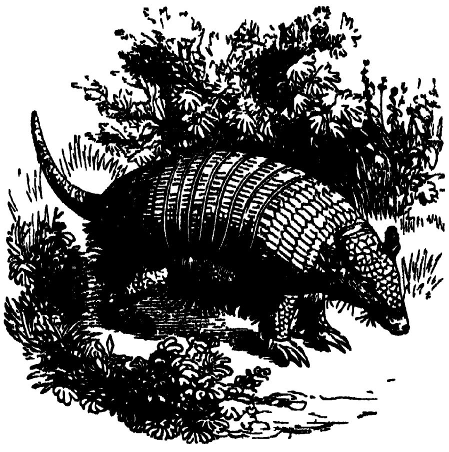
792.—The Poyou, or Weasel-headed Armadillo.

(*Dasypus Encoubert*, Desm.). This Armadillo belongs to Cuvier's section termed Encouberts. It is very common in Paraguay, and burrows in the ground with almost incredible celerity. Its strength and activity are very remarkable, and notwithstanding the shortness of its legs, few men can overtake it It is of a restless unquiet disposition, inquisitive and confident, and when any noise is made at the entrance of its burrow, it is said to come fearlessly forth to investigate the cause. Its voice is a low grunt, like that of a young pig. These animals live solitary or in pairs, and haunt wooded districts, where they excavate very deep burrows when danger threatens, they carry on their mining operations, rendering it difficult to dig them out They feed upon melons, potatoes, and other vegetables; but also to a great extent upon carrion, the natives nevertheless eat the flesh of this species without any repugnance. When it stops or rests on the ground, it has a habit of squatting like a hare in her form, and in this situation the great breadth of the body is very apparent. The head is large, flat, and nearly triangular. the face short, and the muzzle blunt; the ears are moderate.

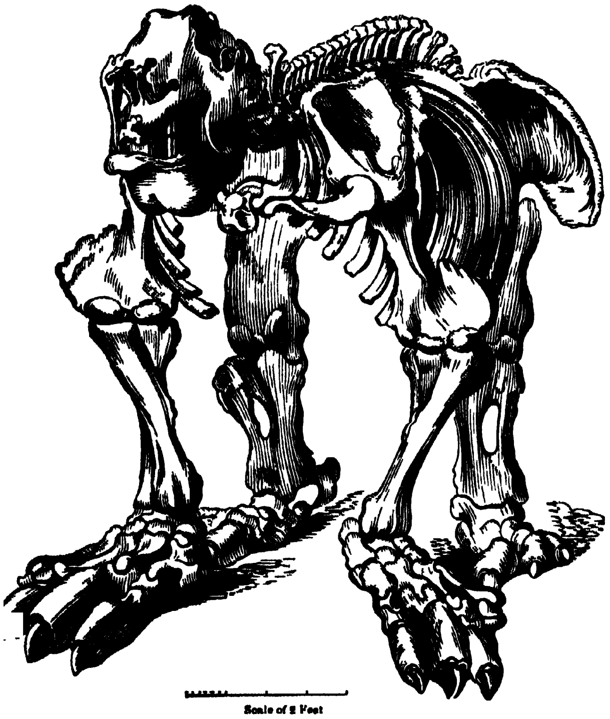
Several individuals of this Armadillo have at various times lived in the menagerie of the Zool. Soc. They appear to have little fear, and soon become



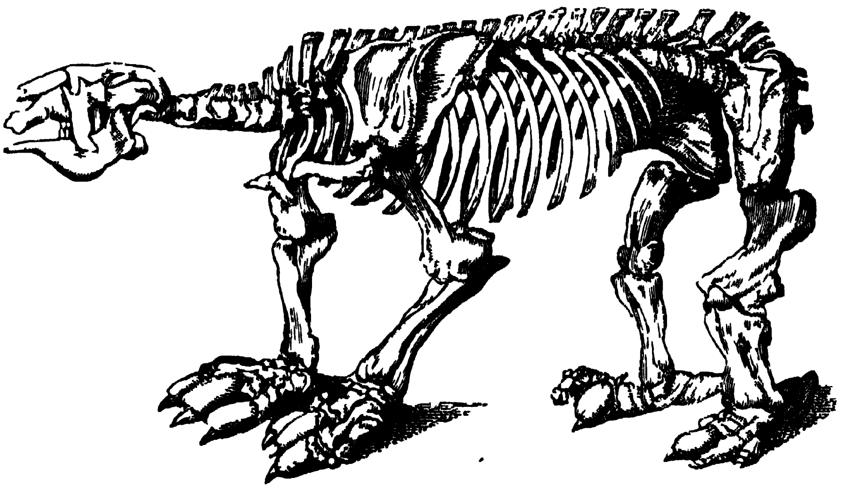
7 —Skeleton of Megatherium



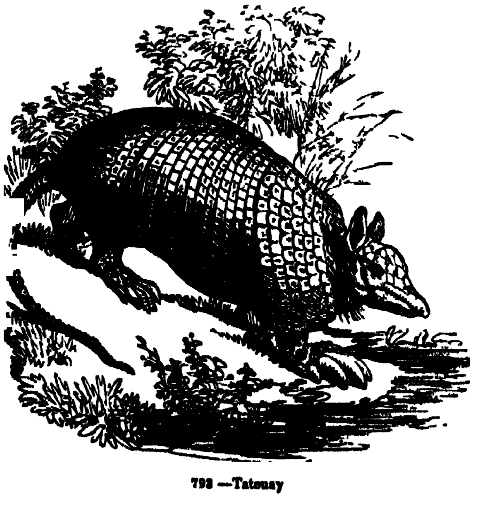
792 —Weasel headed Armadillo



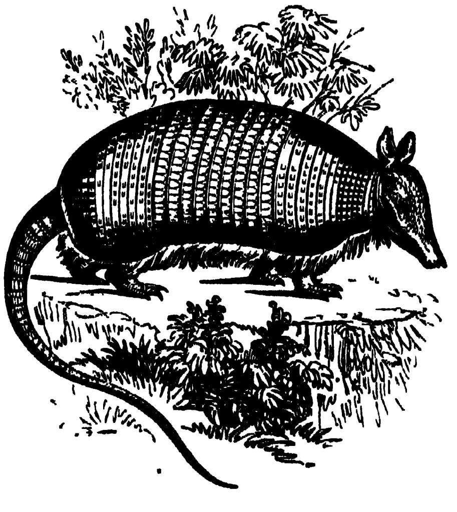
788 -Skeleton of Megatherium

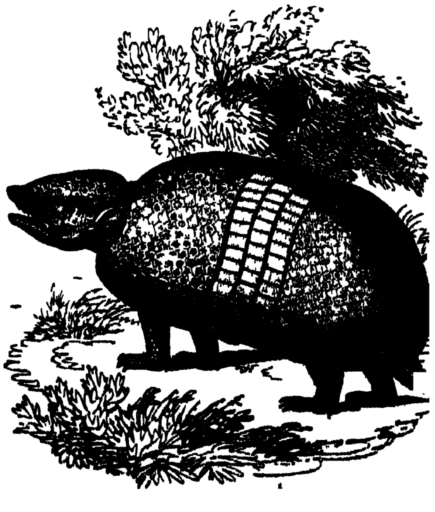


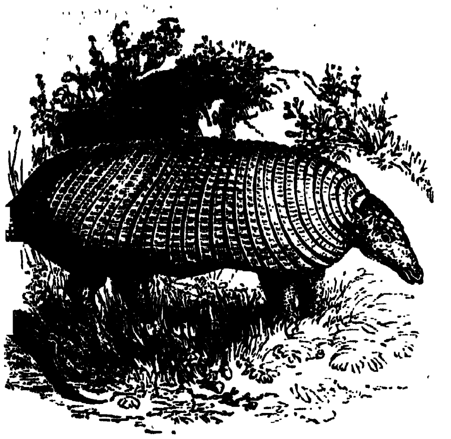
789 —Skeleton of Megatherium



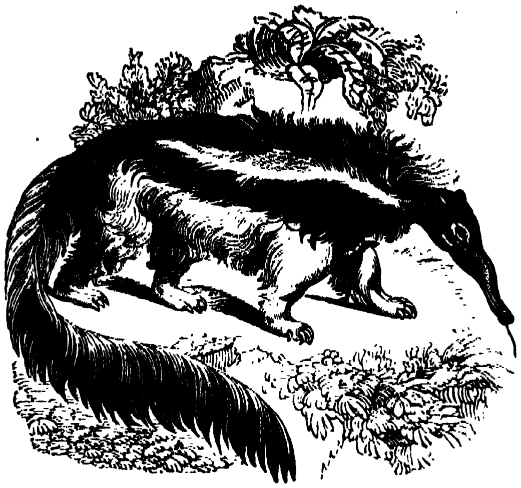
793 —Tatouay



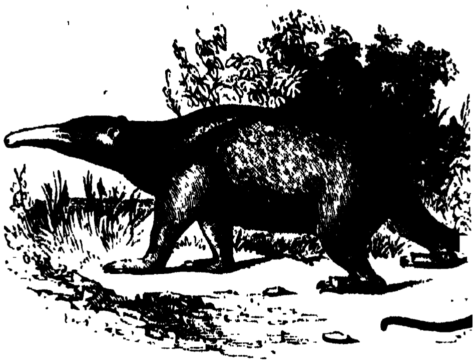




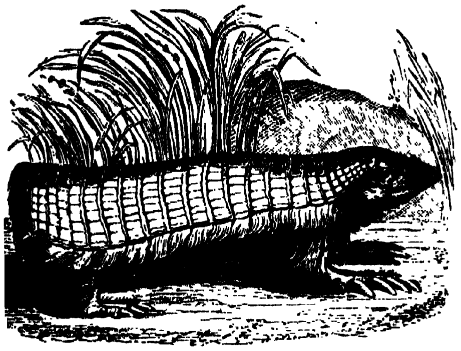
794.—The Great Armadillo.



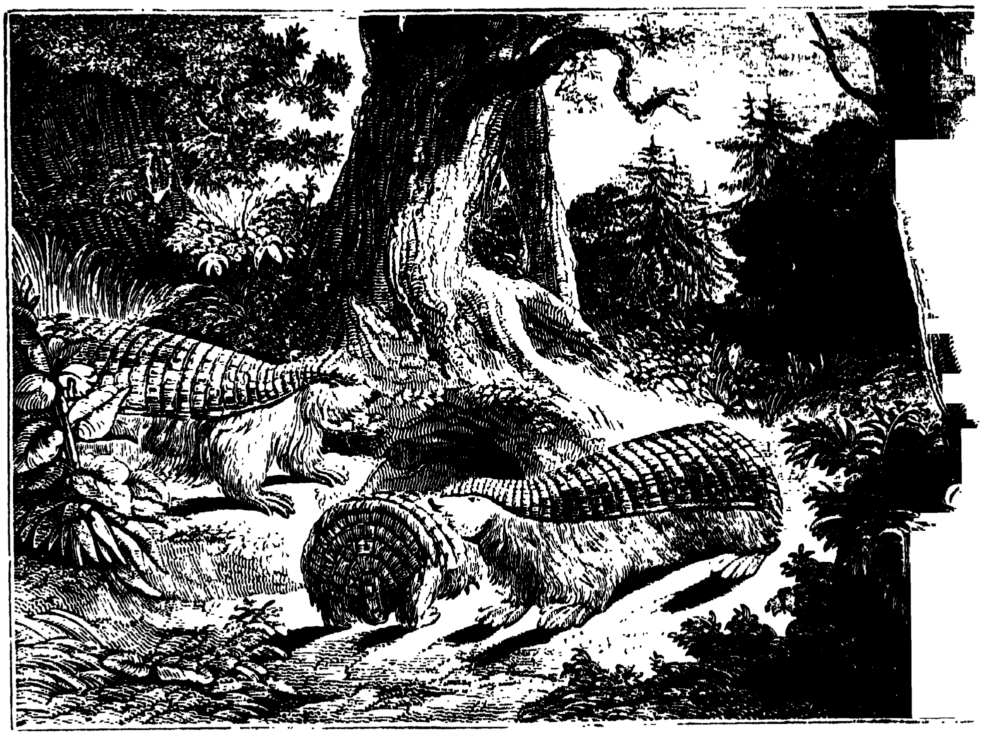
810.—Great Ant-eater.



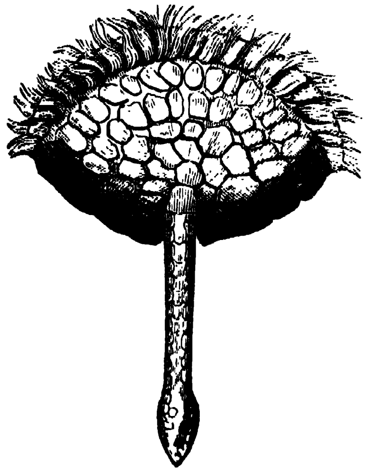
811.—Tamandua.



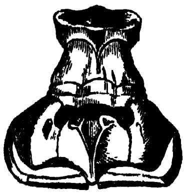
795.—Pichiciago.



796.—Pichiciago

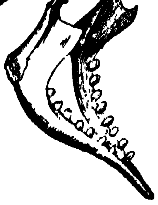


796.—Extremity and Tail of Pichiciago.



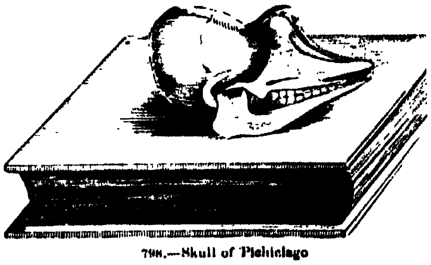
802.

799.



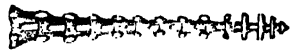
801

800.

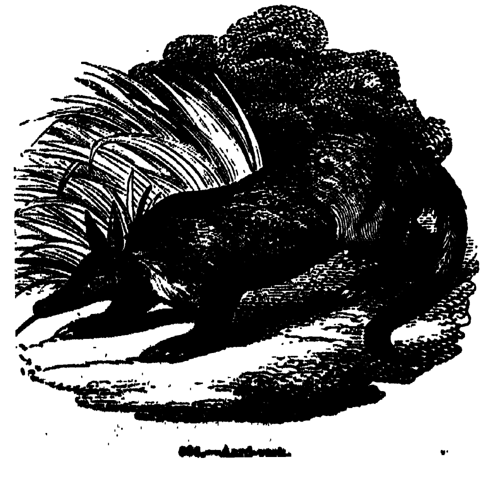


798.—Skull of Pichiciago

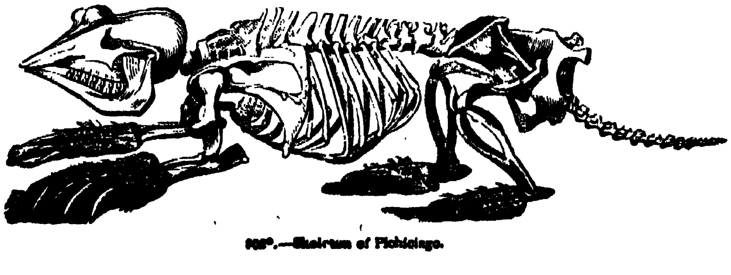
803



805.



[illegible].—Aard-vark.



[illegible].—Skeleton of Pichiciago.

familiar even with strangers; when running about their enclosure, during warm or sunny weather, they turn up the turf rapidly with their noses apparently in search of worms or insects; bread and milk is the diet on which they are fed: their actions are prompt and rapid. The Poyou measures about sixteen inches in the length of the head and body; the tail is about six or seven inches long.

Another example of this section is the Pichiy, or Pichy (*Dasypus minutus*). It is extremely abundant on the arid plains near the Sierra Ventana, and likewise in the neighbourhood of the Rio Negro. "At Bahia Blanca," says Mr. Darwin, "I found in the stomach of this Armadillo, coleoptera, larvæ, roots of plants, and even a small snake of the genus Amphisbæna.

"The Pichy prefers a dry soil; and the sand-dunes near the coast, where for many months it can never taste water, are its favourite resort. In the course of a day's ride near Bahia Blanca several were generally met with. The instant one was observed, it was necessary, in order to catch it, almost to tumble off one's horse; for if the soil was soft, the animal burrowed so quickly, that its hinder quarters almost disappeared before one could alight. The Pichy likewise often tries to escape notice by squatting close to the ground. It appears almost a pity to kill such nice little animals; for, as a Gaucho said while sharpening his knife on the back of one 'Son tan mansos' (They are so quiet)."

The Pichiy measures only ten inches in the length of the head and body, and about four inches in that of the tail. It is diurnal in its habits.

793.—The Tatouay

(*Dasypus Tatouay*, Desm.). This species is an example for Cuvier's section Cabassous. The Tatouay, or Wounded Armadillo, is so called by the Indians in allusion to its tail, which is naked, or as it were rudely deprived of the crust or bony tube which covers this organ in all the other species. The whole length of the tatouay, as given by Azara, is twenty-six inches and a half, including the tail, which is seven inches and a half, round, pointed, and naked, with the exception of a few round scales or crusts on the under surface of the third nearest to the extremity, which frequently trails along the ground when the animal walks: the rest is covered with soft brown fur, interspersed with a few stiff short hairs on the superior surface. The head is longer, narrower, and more attenuated than that of the poyou, though considerably less so than in the peba and mule armadillo; the ears are unusually large, being nearly two inches long, and in figure forming a segment of a circle; the body is round; the claws of the fore-feet, particularly that of the middle toe, are excessively large. The bucklers of the croup and shoulders are composed of ten and seven rows of scales respectively, each scale forming an oblong rectangle; the moveable bands are thirteen in number, composed of scales much smaller than those of the bucklers, and of a nearly square figure. The habits of this species are altogether unknown. It inhabits Guiana and Brazil, and is rarely found so far south as Paraguay.

794. The Great Armadillo

(*Dasypus Gigas*). This Armadillo is an example of Cuvier's group Priodontes. The Great Armadillo measures nearly three feet three inches in length, from the nose to the origin of the tail;, the head is seven inches and a half long, the ears an inch and three-quarters, and the tail one foot five inches. Its superior size is alone sufficient to distinguish this species from all the other known armadillos, but it possesses numerous other characters not less remarkable. Its head is proportionately smaller than in the other species, the forehead is more protuberant, and the face, from the eyes downwards, assumes a tubular cylindrical form, like that of the peba; the ears are of a moderate size, pointed and habitually crouched backwards; the bucklers of the shoulders and croup are composed of nine and eighteen rows of plates respectively, and separated by moveable bands to the number of twelve or thirteen, formed of rectangular scales, about half an inch square. The tail is thick at the root, being upwards of ten inches in circumference: it is gradually attenuated towards the tip, covered with plates disposed in rings at the base, and forming spiral or crescent-shaped lines throughout the rest of its length. The claws are large and powerful, but in their relative form and dimensions differ little from those of the tatouay already described.

This species inhabits Brazil and the northern parts of Paraguay. It is never found in the open country, but keeps close to the great forests, and burrows with surprising facility. Those who are employed in collecting the Jesuits' bark frequently meet with it in the woods, and report that when any of their companions happen to die at a distance from the settlements, they are obliged to surround the body with a double row of stout planks, to prevent it from being scratched up and devoured by the Great Armadillo.

Genus *Chlamyphorus*:

795, 796.—The Pichiciago

(*Chlamyphorus truncatus*). This extraordinary little creature, though scarcely six inches in length, is formed on the plan of the utmost strength and solidity, being destined for burrowing habits. It is a native of Chili, where, like a mole, it works out galleries in the rich soil of the valleys, living for the most part underground in quiet seclusion. So rare is this animal, that it is regarded by the natives as a curiosity. Its food, so far as we are assured by its dentition and the imperfect accounts collected, consists of insects and larvæ: night probably is the season of its activity, and of its unfrequent visits to the "upper world."

The appearance of the pichiciago reminds us of the armadillos, for it is covered above by a shell, not however of very hard consistence, nor very thick, but of a texture between horn and leather. This shield-like plate commences on the head and extends over the back and haunches, over which latter it dips down quite abruptly and perpendicularly, so as to make it seem as if the body was cut off abruptly at its hinder part. It is divided by intersecting furrows into a series of bands or strips, each strip being itself made up of fifteen or twenty plates of a square form, except on the head, which is covered with a single plate composed of a mosaic-work of rounded and irregular portions, and the perpendicular haunch-plate, which is also tessellated (Fig. 797). This horny covering or shield is not fixed by the whole of its inferior surface to the integuments beneath, as is the case with the armadillo; but merely rests on the back, free throughout, "excepting along the spine of the back and top of the head; being attached to the back, immediately above the spine, by a loose cuticular production, and by two remarkable bony processes on the top of the os frontis (bone of forehead), by means of two large plates which are nearly incorporated with the bone beneath; but for this attachment, and the tail being firmly curved beneath the belly, the covering would be very easily detached." The extremity of the tail is formed like a paddle. "The whole surface of the body and under-side of the shield are covered with fine silk-like hair (of a delicate straw colour), longer and finer than that of the mole but not so thick. The anterior of the chest is large, full, and strong: the anterior extremities short, clumsy, and powerful." The hand, which is amazingly thick and compact, is furnished with five powerful but compressed nails, which arranged together in their natural situation, constitute one of the most efficient scrapers or shovels which can be possibly imagined; and expressly adapted for progression underground, but in an equal ratio ill-fitted for celerity on the surface. The hind-legs are comparatively weak, the feet being long and plantigrade, the toes being furnished with small flattened nails. Sight is but a secondary sense as regards its importance in the economy of an animal living in darkness beneath the ground. The organs of vision, therefore, are very minute, and buried in the silky fur by which the circular orifices of the ears are completely concealed. The head is almost conical in figure, going off from a broad base to a pointed muzzle furnished with an enlarged cartilage, somewhat as in the hog, and doubtless for the purpose of grubbing and burrowing for food.

In accordance with the details of external configuration, the skeleton is equally indicative of the animal's habits. The skull is firm, and prevented from being pressed upon by the shield which rests on the two projections. The bones of the fore-limbs are short, thick, and angular; the scapulæ broad and strong: the ribs thick, and capable of resisting great pressure. The hip-bones are of singular construction, and admirably formed for protecting the internal organs from injury. Such is an outline of the structure and habits of the chlamyphorus, an animal which, though bearing in some points a resemblance to the armadillos, yet possesses characters so exclusively its own as to render it one of the most interesting discoveries in zoology. Of this rare animal two specimens alone exist, one in the Museum of Philadelphia, the other, with its skeleton, in the Museum of the Zoological Society, London.

For an account of the structure of this animal, see Mr. Yarrell's paper in the 'Zoological Journal.' Fig. 798 represents a lateral view of the skull of the pichiciago; Fig. 799, an upper view; Fig. 800, a basal view of the same; Fig. 801, lower jaw; Fig. 802, the cervical vertebræ, and first bone of the sternum, with parts of the first and second ribs seen from below. Fig. 802*, the skeleton; Fig. 803, pelvis seen from behind; Fig. 804, same seen from below: Fig. 805 vertebræ of tail.

Genus *Orycteropus*:—

806.—The Aard-vark

(*Orycteropus Capensis*). This animal, known to the colonists of the Cape of Good Hope by the name of aard-vark, or earth-hog, is the sole example, as far as ascertained, of the genus Orycteropus. The aard-vark is essentially burrowing in its habits, and insectivorous in its diet. Its proportions are thick and strong, though the general contour is elongated and the limbs short. It is neither protected by plates nor scales, but the skin is thick, tough, and coarse, and covered with stiff hair, resembling bristles in quality, and somewhat scantily disposed, especially on the head. The muzzle is elongated, narrow, and hog-like at its apex; the mouth small, and the tongue extensible; the eyes are rather small; the ears large, long, and pointed; the tail tapering from a very stout base; the limbs are short, thick, and very muscular; the fore-feet have four stout toes armed with large solid nails, resembling hoofs in appearance, and admirably adapted as scrapers of the dry hard ground of an African desert. The hind-feet are long and plantigrade, having five toes armed with nails of the same character as those of the fore-feet.

The teeth consist of seven molars on each side above, of which the first is minute and distinct from the rest, and six on each side below. Fig. 807 gives the teeth of the upper jaw in two views; Fig. 808, those of the lower jaw; Fig. 809, the teeth of both jaws together.

The aard-vark attains to a considerable size, measuring, when fully grown, upwards of five feet in total length, of which the tail is one foot eight or nine inches. Its food consists exclusively of ants, which it takes by means of its long glutinous tongue, after effecting a breach in the dome-like houses of solid indurated mud-work which those insects construct, and which are very abundant in certain districts. These hillocks are from two to three feet high, and their structure is irregularly cellular, not unlike volcanic honeycomb stone, exhibiting a maze of passages opening into each other. In demolishing these buildings for the sake of their multitudinous inmates, which are devoured by wholesale, the aard-vark employs the active portion of its existence. The dwelling of the aard-vark itself is at a burrow at a little distance beneath the surface of the ground, out of which it comes forth only during the night, for in its habits it is entirely nocturnal; hence during the day it is seldom seen, but may be observed as the dusk approaches creeping from its hole intent upon its prey. These burrows, where numerous (as they are in some districts, where also innumerable ant-hills cover the plain), are dangerous to waggons travelling over the country; and cattle and horses occasionally break through the surface of the ground into them, and thus suddenly stumble or fall. They are often very extensive, and it is incredible with what despatch the animal makes them, and with what rapidity it mines onwards when endeavouring to elude the search of persons attempting to dig it out of its retreat: hence it is not captured without difficulty. The flesh of the aard-vark, and especially the hind quarters when made into hams, are accounted excellent.

The aard-vark is a connecting link between the armadillos and the next section.

Family Toothless Ant-eaters:—

Genus *Myrmecophaga*.—The genus Myrmecophaga, as established by Linnæus and retained by Desmarest and others, is not strictly natural. Perhaps we should hardly be justified in separating the Tamandua from the Tamanoir (Great Ant-bear, or Ant eater); but with respect to the little two-clawed ant-eater it certainly forms the type of a distinct genus.

810.—The Great Ant-eater, or Ant-bear

(*Myrmecophaga jubata*). The Tamanoir of Buffon. This species, a native of Guiana, Brazil, and Paraguay, is characterized by the total absence of teeth, a narrow head with an extremely slender elongated snout, contrasting strangely with the clumsy massive contour of the limbs and body. The mouth is a small slit at the extremity of the snout; the eyes are small, and the tongue long, cylindrical, and protractile, constituting an organ for obtaining insect food, and is lubricated by a gummy saliva; the limbs are short, but of great thickness, furnished with huge hook-like claws well adapted for making forcible entrance into the solid dwellings of the Termite ants. The claws of the fore-feet are four in number, the inner one being the smallest; of the hind feet, five. Those of the fore-feet, in a state of repose or when the animal is walking, are doubled inwards on a rough callous pad, and the outer portion only of the fore-feet is applied to the ground. The claws of the hind-feet are short, and the sole is a naked protuberant pad. The ears are short and round; the tail is of great thickness at the base.

whence it narrows to the apex, being laterally compressed, but its form is hid beneath a profusion of long, coarse, flowing hair, which hangs like a full plume or fringe.

The hair of the head is short and close, but over all the rest of the animal it is long and shaggy, particularly on the top of the neck and along the back, where it forms a kind of long mane, and on the tail, where it is a foot in length, and hangs down on each side, sweeping the ground when the ant-bear walks.

The prevailing colour on the head, face, and cheeks of the ant-bear is a mixture of grey and brown; that on the upper parts of the body and tail is deep brown, mixed with silvery white. A broad black band, bordered on each side with a similar one of white or light greyish brown colour, commences on the chest, and passes obliquely over each shoulder, diminishing gradually as it approaches the loins, where it ends in a point. The sides, arms, and thighs are silvery grey, with a slight mixture of brown, marked with two deep black spots, one on the carpus, and the other on the toes, the hind legs are almost perfectly black, and the breast and belly of a deep brown, almost equally obscure.

The following is an abstract of the habits of this animal, as observed by Dr Schomburgk (see 'Zool. Proceedings,' 1839, p. 21):—

Dr. Schomburgk observes, that at a distance the ant-bear appears to be a much taller animal than it really is, owing to the elongated and nearly erect hair of the mane, and also the erect manner in which it carries its large bushy tail When walking, the outer portion of the fore-foot is applied to the ground, and the long claws are then doubled inwards. It runs with a peculiar trot, and is not, as has been represented, slow in its movements and easily overtaken, for when chased, it will keep a horse in canter, and does not tire readily. White ants, or termites, constitute its chief food When the ant-bear meets with one of the tumuli constructed by the white ants, it immediately pulls the fabric down by means of its large strong claws, and when the ants are thus exposed, its long slender tongue is thrust out to collect them The movements of the tongue, alternately being protruded and retracted, are so rapid, says Dr Schomburgk, that it is no longer surprising how so large an animal can satiate its appetite with such minute insects The ant-bear is, however, an economist, and does not destroy more than he wants When he finds that the termites diminish on the surface, and every one seeks to escape in the numerous galleries of the ruined edifice, he uses his left foot to hold some large lumps of the nest, whilst with the right he leisurely pulls them to pieces.

With the termites he swallows a considerable quantity of the material of which the ants' nest is constructed Of this fact Dr Schomburgk assured himself by dissection, and he is of opinion that the substance of the nest serves as a corrector

"It has been generally thought," says Dr Schomburgk, "that the ant bear lives exclusively on ants, this, however, is not the case. In one which I dissected a year ago a species of Julus was found, and the avidity with which an adult one now in my possession swallowed fresh meat, which was hashed up for it, makes me believe that even in the wild state it does not satisfy itself exclusively with ants, and, provided the food is of such a size that it can take it up with its moveable upper lip, it does not despise it." According to the same authority the great anteater makes no burrow, its tail serving as a sufficient protection: the female produces a single offspring, which she carries on her back; she defends herself by striking with her fore feet, while raised on her haunches, or throws herself on her back, dealing blows with both her claws The young soon become tame and familiar, growl like a puppy, or utter a plaintive whine. The sense of smell is exquisite, and the animal is directed more by this than by sight. The teats of the female are two, and pectoral. The young remains with its parent for the space of a year

Dr. Schomburgk domesticated an adult female ant-eater, which he found capable of climbing with great facility, and also of taking up objects with its paws. It ate beef and even fish cut small. When not asleep, it rested on its haunches; but in feeding kneeled as goats and sheep often do. Its height was three feet, the length of the head one foot three inches; of the back three feet seven inches; of the tail three feet six inches.

811.—THE TAMANDUA

(***Myrmecophaga Tamandua***, **Cuv.). The Middle Ant-eater, Shaw; the Cagouaré of Azara.**

This species is a native of Brazil and Paraguay. In the general plan of its osteology, the Tamandua agrees with the Tamanoir, but the bones of the muzzle are shorter than the cranial portion, instead of being twice as long: hence the whole head is more abbreviated: the snout is also more conical, and presents a less tubular appearance. Independently, however, of this difference, the Tamandua is easily distinguished from its congener. It is far inferior in size, and its tail, instead of being furnished with full flowing hair, is a long, taper, thinly covered organ of prehension, nearly naked indeed at the tip, though well covered at the base. The fur of the body is thick, dense, and harsh, and on the hinder quarters of tolerable length, but on the head and fore-quarters it is short, wiry, upright, and glossy, and radiates from an areola between the shoulders, the point of the muzzle is bare, the eyes are small; the ears of a moderate size and rounded; the mouth is small, and the nostrils are lateral slits.

In the structure of the limbs it closely resembles its larger congener. The Tamandua when fully grown measures about two feet in the length of the head and body, and sixteen or seventeen inches in that of the tail. A young specimen before us measures nineteen inches in the body, and thirteen in the tail. Its colour on the head and fore quarters is yellowish white. the sides of the body, the haunches, and the under surface, together with the base of the tail, being black, and a black stripe passes along each shoulder

M Geoffroy regards as distinct species one altogether black, which he terms *T nigra*, and another with a double shoulder-stripe, which he has named *T bivittata* They are, however, most probably only varieties, at least Cuvier states, in his 'Ossemens Fossiles,' that however these animals may vary in colour, they present no difference in their proportions, nor in the details of their skeletons, though he has rigidly compared them together Azara tells us that he once found dead a Cagouaré thirty-seven inches and three-quarters long, which was of an universal yellowish white, whence he concludes that the perfect livery is not gained until the second year The young are of an universal pale cinnamon colour

In its manners the Tamandua agrees with the Tamanoir, with this difference, that it often climbs trees, aiding itself by its prehensile tail, which, however, is much inferior as a prehensile organ to that of the little two-toed ant-eater, and its claws are also less calculated for arboreal habits Azara suspects that it feeds much upon honey and bees, which he adds, are here (in Paraguay) destitute of stings, and take up their abode in trees When reposing, the Tamandua doubles its head on its chest, lies on its belly, places its fore limbs along its sides and its tail over its body It smells strongly of musk, and the odour when the animal is irritated, is very disagreeable, and may be perceived at a great distance The female produces one at a birth, it is, says Azara, very ugly, and is carried by the mother on her shoulders

812—THE LITTLE ANT-EATER

(*Myrmecophaga didactyla*, Linn) The distinguishing characters of this species consist in the shortness of the muzzle, which is conical, in the number of the claws, which are two on each fore-foot, of hook like shape, compressed laterally and very sharp, the outer one being considerably the largest, in the oblique position of the hind-feet, which are armed with four short compressed claws, and lastly in the strongly prehensile power of the tail, which is very long and covered with fine silky fur, like that of the body, except for three inches of the under surface at the tip, where as in the spider monkey it is perfectly naked The claws of the fore feet, which resemble those of the sloth, are folded down on a callous pad, and with these the little creature can cling to a branch while the inward tournure of the hind-limbs combines with the prehensile structure of the tail to fit it for its arboreal residence It may be observed that the animal possesses clavicles, which do not exist in the great ant eater, the Tamandua, nor yet in the Pangolins

The eyes are small, the ears close and buried in the fur, the mouth is small, and the tongue long and vermiform The fur is exquisitely fine, soft, curled, and silky, the general colour is delicate golden straw, with a brownish mark on the back, often wanting Length of head and body, ten inches. of the tail, ten inches and a half

The little ant eater is a native of Guiana and Brazil, where it tenants the forests, suspending itself by its long tail, as well as clinging by means of its claws it searches for insects among the fissures of the bark, and attacks the nests of wasps, the nymphæ of which it pulls out with its fore claws or nippers, and eats them while it sits up like a squirrel. In defending themselves, these animals strike with both the fore-paws at once, and with considerable force. In their habits they are nocturnal, sleeping with the tail twisted round their perch. They utter no cry. The female is said to breed in the hollows of trees, making a bed of leaves, and producing only one at a birth. There is a pale variety, regarded by some as a distinct species.

Genus *Manis*.—The American Ant-eaters are represented in India and Africa by the Pangolins, or Scaly Ant-eaters, which constitute the genus Manis of Linnæus These singular animals may at once be known by the armour of dense horny scales, or triangular plates overlapping each other, by which every part of the body, except the middle line of the under surface, is completely invested. The body is depressed, rounded above, long and low; the head is small and conical, the eyes are minute, there are no external ears, the mouth is small, and the tongue long and extensible, the tail is long and broad, and covered above and below with hard imbricated scales, the limbs are very short and thick, and mailed like the rest of the body, no distinct toes are apparent beyond the claws, which on the fore-feet are five in number, the three central ones being of enormous size, arched, thick, and bluntly pointed The first and the last claw are very small. The large claws fold down on a thick coarse pad, as in the ant-eater, and the mode of progression in both cases is the same. The hind-feet have five short, thick, blunt claws, edging a pad-like sole, covered with coarse granular skin, and so protuberant, that the claws do not fairly touch the ground. The ungueal phalanges, or last joints of the toes (both of the fore and hind feet), which are sheathed by the claws, are remarkable for being bifurcated at their extremity, a peculiarity found in no other of the Edentata. It is evidently a conformation intended to give the claws a more secure attachment

The osseous framework in general is moulded upon the same plan as that of the ant-eaters Slow in their motions, and unfurnished with weapons of offence, the manis defies the assaults of almost every foe, when attacked, it rolls itself up into a ball, wraps its tail over the head, and raises all its pointed and sharp-edged scales in serried array, and thus invulnerable, conquers by passive resistance. The food of the manis consists of termites and ants, which it takes in the same manner as the American ant-eaters It dwells in holes which it burrows out in the ground

813—THE SHORT-TAILED MANIS

(*Manis brachyura*, Erxl) This species is a native of India, and is very common in the Dukhun, living on termite ants The specimen before us measures about four feet in total length A second Indian species is from Java, it is the Manis Javanica of Desmarest A third species has recently been discovered by Mr Hodgson in Nepâl.

813—THE LONG-TAILED MANIS

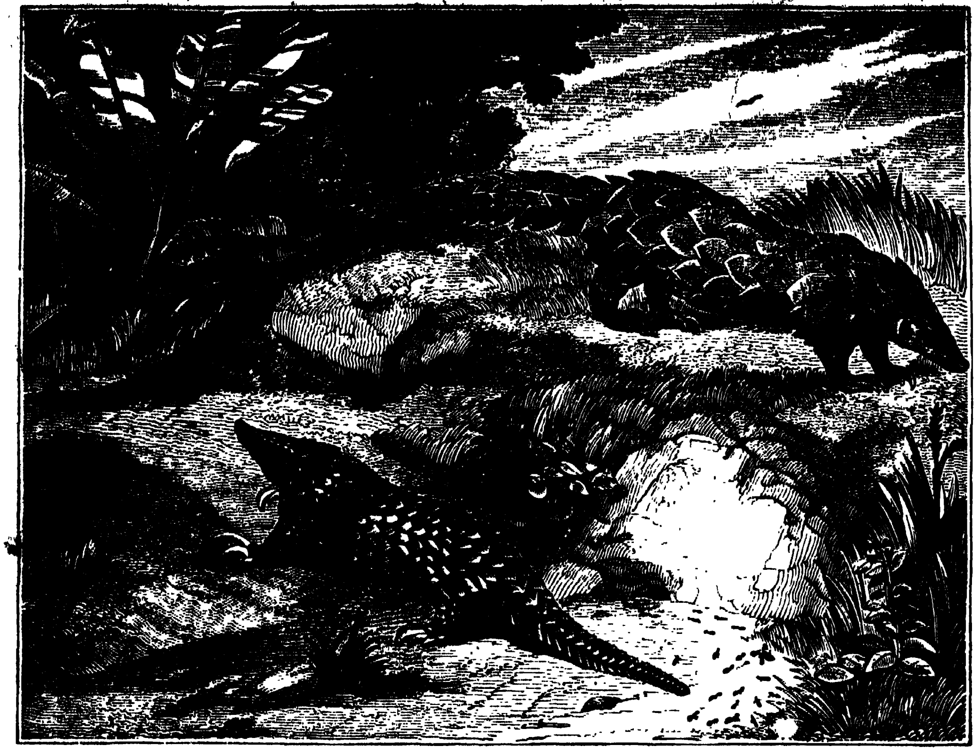
(*Manis longicaudata* Geoff) This is the best-known of the African species, and attains to a large size measuring about two feet in the length of the body, and about three feet in the length of the tail.

811—TEMMINCK'S MANIS

(*Manis Temminckii*, Smuts) The present pangolin is a native of South Africa Mr Bennett observes that the most remarkable features of this animal are the shortness of the head, the breadth of the body and the breadth of the tail, which is nearly equal to that of the body, and continues throughout the greater part of its extent of nearly the same width, tapering only slightly towards the end, where it is rounded and almost truncate. Mr Bennett further remarks that a peculiarity in the distribution of the scales of Manis Temminckii is the cessation of the middle series of them at a short distance anterior to the extremity of the tail, so that the last four transverse rows consist of four scales each, each of the preceding rows having five. ('Zool Proc 1834)

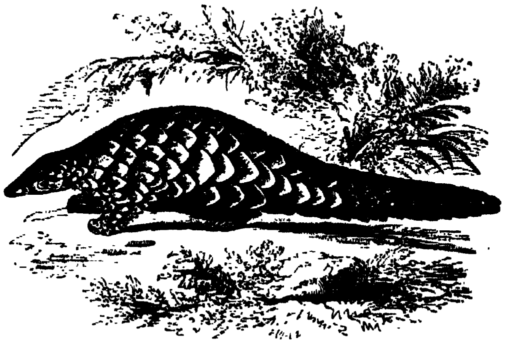
Habits, Food &c—Dr Smith relates that when Manis Temminckii is discovered, it never attempts to escape, but instantly rolls itself up into a globular form, taking especial care of its head, which is the only part that is easily injured Ants constitute its chief and favourite food, and these it secures by extending its projectile tongue into holes which may exist in the habitations of these insects or which it may itself form, and when, by means of the glutinous matter with which its tongue is covered, a full load has been received, a sudden retraction of the retractor muscles carries both into its mouth, after which the ants are immediately swallowed. ('Illustrations of the Zoology of South Africa')

It is a rare species, the natives having a prejudice against it, and burning every individual they find, so that it is almost extirpated in many places Fig. 815 represents the posterior view of the skull of the short-tailed manis, Fig. 816, the skull seen from above, Fig 817, ditto seen from below, Fig. 818, ditto profile · Fig. 819, the fore-foot; Fig 820, the hind foot; Fig. 821, the skeleton; Fig. 822, the pelvis.

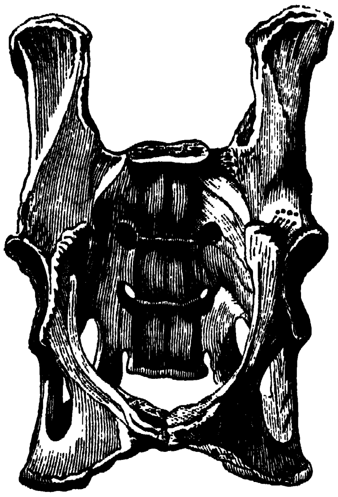


813.—Short tailed Manis and Long-tailed Manis.

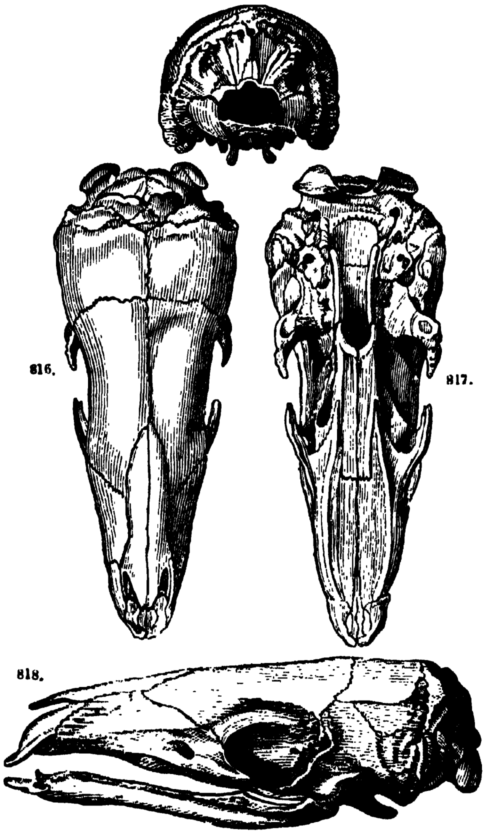
812.—Little Ant-eater.



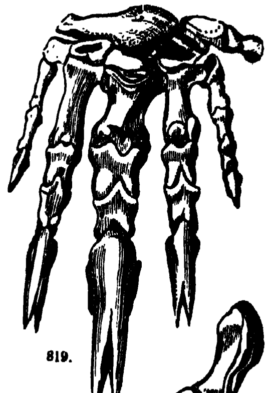
814.—Temminck's Manis.



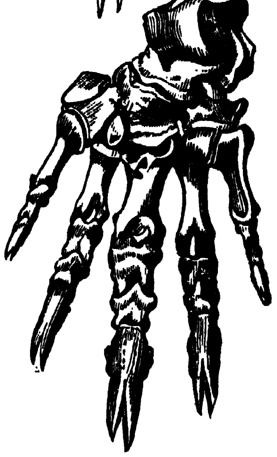
822.



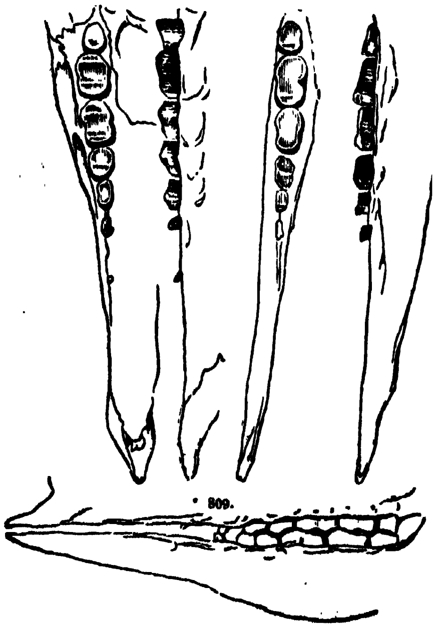
815—818.—Skull of Short-tailed Manis.



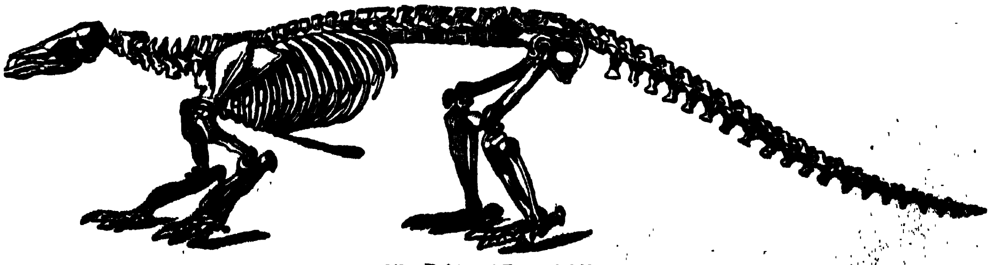
819.



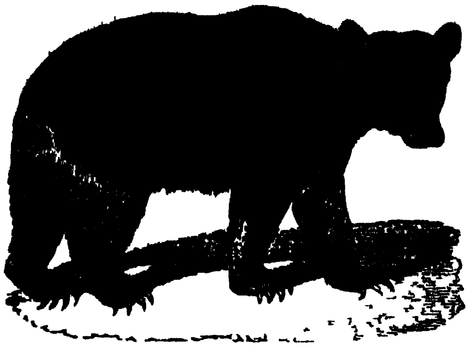
820



807—809.—Teeth of Aard-vark.

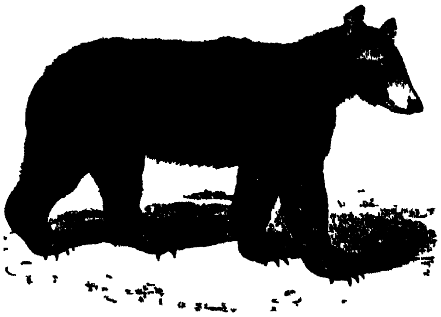


821.—Skeleton of Short-tailed Manis.



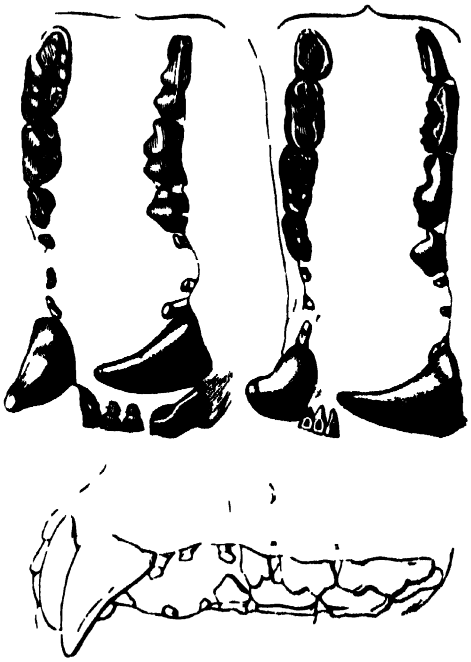
829.—Brown Bear.

831.—Siberian Bears.

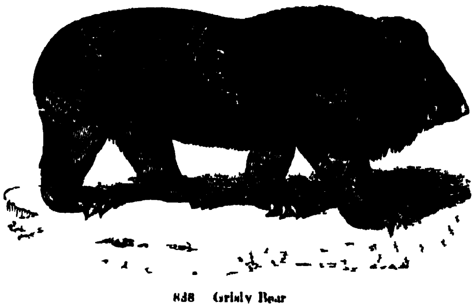


832.—American Black Bear

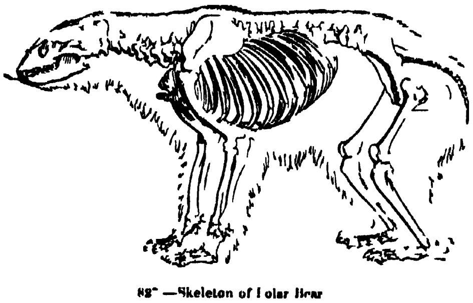
828.—Bear and Bees



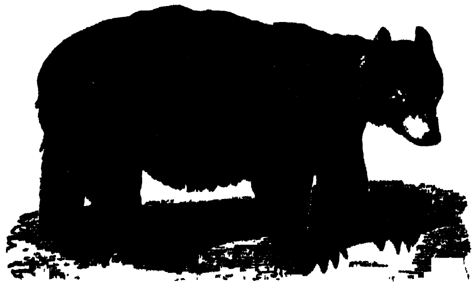
834.—Teeth of Bear



838. Grisly Bear



8[illegible] —Skeleton of Polar Bear



ORDER CARNIVORA.

URSIDÆ.

(**Bears, and allied animals**).—The members of the family group termed Ursidæ are characterized for the most part by their robust figure, by their heavy gait, and plantigrade walk, as well as by the tubercular surface of the grinders—a form connected with diet, in great part at least, consisting of vegetable products. The alimentary canal is simple. Most of the species are expert climbers: they conceal themselves in caves, holes of the earth, or in hollow trees, in which the females produce their young.

We may here remark that under the general term Plantigrada many genera have been associated together, which are by no means nearly related; and some indeed have been placed with the bears, only from their feet being plantigrade, while in reality they belong to another family group. We shall not adopt the terms Plantigrada or Digitigrada as the names of sections of the Carnivora; the animals of which order, as will be shown on a future occasion, resolve themselves into well-marked families.

Genus *Ursus*.—The animals of this genus, viz., the Bears, are distinguished by their ponderous bulk, massive limbs, and heavy gait: they are completely plantigrade in their walk, but their huge claws, which are tremendous weapons, are not retractile; they are, however, well adapted for digging. They are completely omnivorous, devouring flesh, vegetable roots, grain, fruits, and honey. "The bear," says Aristotle, "is an omnivorous animal, and by the suppleness of its body climbs trees, and eats the fruits, and also legumes; it devours honey likewise, having first broken up the hives; as well as crabs, ants, and flesh."

In the 'Tour on the Prairies,' the ranger describes the fondness of the bear for honey in language which, if it be not quite classical, is at all events graphic. "The bears is the knowingest varmint for finding out a bee-tree in the world; they 'll gnaw for a whole day together at the trunk, till they make a hole big enough to get in their paws, and then they 'll haul out the honey, bees and all."

We do not know whether the predilection of the bear for this luscious food ever brings him into the trouble in which he is represented in our woodcut, Fig. 823; but we may easily conceive that the swarm would endeavour to revenge the assaults upon their hive.

The dental formula of the genus Ursus is as follows:—Incisors $\frac{6}{6}$; Canines $\frac{1-1}{1-1}$; Molars $\frac{6-6}{7-7}=42$ (Fig. 824.) Fig. 827 represents the skeleton of the Polar Bear.

The feet are 5-toed; the tail is short; the limbs are robust; the eyes are small, but quick and animated; and the head is large and broad across the top.

Europe, Asia, and America present us each with their peculiar species of this genus; but with respect to Africa the existence of any there has been more than doubted, and many attempts have been made to explain away the passages in ancient writers referring to the bear in Africa.

Pliny, however, not only asserts that the bear is not an African animal, but expresses surprise at a statement in some records that a hundred Numidian bears were brought to Rome during the consulship of M. Piso and M. Messala, for the Circus, by Domitius Ahenobarbus, curule ædile, who also brought a hundred Æthiopian chasseurs (see lib. viii.). But as Pliny elsewhere states that there are neither boars, nor stags, nor goats, nor bears in Africa, we know how far he can be trusted. That there are bears in Africa, notwithstanding all that has been said to the contrary, is now well established.

Ehrenberg hunted a bear in Abyssinia: his words are, "Moreover we ourselves have seen in the mountains of Abyssinia, and therefore in Africa itself, an animal most like to a bear—nay, why had I not said a bear?—and hunted it repeatedly, but in vain. It is called by the natives Karrai." And he also observes that Forskal has brought tidings of an indigenous Arabian bear.

It is ascertained, moreover, that the bear exists on the range of the Atlas and the Tetuan mountains; and in a letter to the curator of the Zoological Society, from Edward Blyth, Esq., while on his voyage to India, is the following interesting passage:—

"Upon questioning Mr. Crowther respecting the bear of Mount Atlas, which has been suspected to be the Syriacus, he knew it well; and it proves to be a very different animal. An adult female was inferior in size to the American black bear, but more robustly formed, the face much shorter and broader, though the muzzle was pointed, and both its toes and claws were remarkably short (for a bear), the latter being also particularly stout. Hair black, or rather of a brownish black, and shaggy, about four or five inches long; but, on the under parts, of an orange rufous colour; the muzzle black. This individual was killed at the foot of the Tetuan mountains, about twenty-five miles from that of the Atlas. It is considered a rare species in that part; and feeds on roots, acorns, and fruits. It does not climb with facility; and is stated to be very different-looking from any other bear. The skin, like that of the 'Sherif-al-Wady,'[*] was attempted to be preserved, but unfortunately met with the same fate." ('Zool. Proceeds.' August 10, 1841.)

The genus Ursus has been divided into the following sub-genera, upon somewhat uncertain grounds, viz.:—Danis, Prochilus, Helarctos, and Thalarctos.

823, 828, 829, 830.—The Brown Bear

(*Ursus Arctos*). Ours of the French: Orso of the Italians; Bar of the Germans; Björn of the Swedes. This species, which is spread through all the mountain districts of Europe, from the arctic circle to the Alps and Pyrenees, and, as it is stated, through Siberia, Kamtschatka, and even Japan to the eastward, was formerly a tenant of the forests and wild hills of our island; whence in the time of the Romans it was imported to the capital of the world, in order to gratify the people by its combats in the Circus. If Martial may be trusted, its ferocity was sometimes turned against the persons of criminals, who were condemned to a horrid death.

The bear appears to have lingered, as did the wolf, longer in Scotland than in England, that country affording it better concealment; for in 'The History of the Gordons' it is stated that one of the family, so late as the year 1057, was directed by the king to carry three bears' heads on his banner, as a reward for his valour in slaying a fierce bear.

In later times, when a virgin queen enjoyed the sports of the bear-garden in Southwark, and a bear-ward was kept in the establishment of the highest nobility, bears were imported from the Continent to fight with savage dogs for "his lordshippe's pastime," no less than for the diversion of the commonalty. Such were the recreations of "the good old English gentleman, all in the olden time."

The general habits of the bear are well known: unsocial and solitary, they frequent the gloomiest recesses among the mountains, glens, and caverns, and the depths of the forests: there they dig or enlarge a cave in which to dwell, or usurp the hollow of some huge decayed tree, or form a sort of rude den under the covert of a maze of intertwined branches, lining their habitation with moss. Here they pass the winter, in a state bordering on torpidity; and it is during this retirement, in January, that the female brings forth her young, which are well formed, and very far from being the shapeless mass supposed by the ancients. The cubs are from one to three in number—mostly, however, two; at first their eyes are closed, and they remain blind for thirty days. When the bear retires to its winter-quarters on the approach of the cold season it is very fat, but on coming forth in the spring is generally observed to be lean, the fat having been absorbed for the nutriment of the system during the animal's torpidity: but a query here exists,—is the female, who produces her young, and has to attend to them, torpid? and can she suckle them without receiving any aliment herself? This is very improbable; and tends to prove that the seclusion of the animal is neither so absolute, nor its torpidity so complete, as is generally asserted. That bears support themselves in their winter retirement by sucking their paws is a vulgar error, and need not be seriously refuted.

Unless provoked by aggression, or incited by hunger, the Brown Bear seldom attacks man; but when roused is most formidable, and displays greater activity and address than might be expected from its heavy clumsy figure. Its strength is prodigious. Mr. Nilsson, a Swede, states that a bear has been seen, bearing a dead horse in his fore paws, to walk on his hind legs on a tree stretched across a river. (Fig. 828.) The firm support afforded by the well-developed sole and the form of the hinder limbs (the thigh-bone, though shorter, closely resembling in form that of man) enable these animals not only to rear themselves up on their hind feet, but even to walk erect with considerable facility, as was observed by Mr. Lloyd ('Northern Field-Sports'), who asserts that they can proceed along in that position bearing the heaviest burdens.

In the wilds of the North the bear attains to a prodigious magnitude: Mr. Lloyd killed one of the weight of four hundred and sixty pounds, and they have been found to exceed seven hundred.

Though bears, as Mr. Falk informs us, may reside for years in the neighbourhood of cattle without doing them any injury, yet they will sometimes visit herds solely from the desire of prey, and instances have been known of their climbing upon and tearing off the roofs of cow-houses, in order to gain admittance to the cattle confined within, which, after slaughtering, they have managed to drag through the opening in the low roof, and carry away.

In the North the bear is hunted and taken in pit-falls and traps of various kinds, and in some countries there is no part of the animal which is without value.

The courage and devotion of the female bear in defence of her young are proverbial. No adventure can be fraught with more danger to the hunter than an attack upon one accompanied by her cubs, for the sake of which wounds and even death are encountered with unflinching resolution, uttering deep growls till the last moment.

The bear climbs trees or rocks with great dexterity, and descends in the attitude in which it ascends, availing itself cautiously of every projection. Those who have seen the bears in the Zoological Gardens climb to the top of their long poles, and fearlessly balance themselves at the top, soliciting food from the visitors, may conceive some idea of the animal's address. It also swims well and fast, and during the heat of summer frequently takes the water for the sake of the bath. When captured young, the bear is easily domesticated, and evinces no trifling share of intelligence. The age to which it attains is very considerable. Individuals have been kept between forty and fifty years in captivity.

A variety (Ursus Pyrenaicus, F. Cuv.), considered by some naturalists as a distinct species, inhabits the Pyrenees and the Asturias.

831, 832.—The Siberian Bear

(*Ursus collaris*) approaches close in form to the Brown Bear, with the distinction of a large whitish collar, which passes over the upper part of the back and shoulders, and is completed on the breast. This is not improbably also a variety.

Dr. Richardson describes a Brown Bear which he terms the Barren-ground Bear (Ursus Arctos? Americanus), and which is a native of the barren lands lying northward and eastward of the Great Slave Lake and extending to the Arctic Sea. "It differs," he says, "from the American Black Bear, in its greater size, profile, physiognomy, longer soles, and tail; and from the Grisly Bear also in colour and the comparative smallness of its claws. Its greatest affinity is with the Brown Bear of Norway, but its identity with that species has not been established by actual comparison. It frequents th sea-coast in the autumn in considerable numbers for the purpose of feeding on fish."

833, 834, 835.—The American Black Bear

(*Ursus Americanus*). This species, the Sass of the Chippewayan Indians, the Musquaw of the Crees, is smaller than the Brown Bear; its muzzle is narrower, more arched and pointed, continued in a line without interruption from the forehead; the ears are more distant; and the fur, instead of being shaggy, is soft, smooth, and glossy black.

"The Black Bear," says Dr. Richardson, "inhabits every wooded district of the American continent, from the Atlantic to the Pacific, and from Carolina to the shores of the Arctic Sea." Everywhere, however, its numbers have been greatly thinned, owing to the value of the animal's skin in commerce; besides which the tide of European colonization has driven it to remoter districts, to mountain ranges, and vast forests as yet untouched by the axe, or only recently invaded by the settler. In some parts of Canada it is still common, and tolerably abundant on the western coast as far as California. It has, we believe, been seen, but that rarely, in the Blue Ridge in Virginia.

The Black Bear feeds on berries and wild fruits; and to these it adds roots and eggs; and though it does not refuse animal food, yet it does not eat it from choice, but necessity; utterly neglecting it if vegetable aliment can be obtained.

This species is not very daring, and, unless forced to self-defence, or wounded, will seldom venture to attack a man, except in the instance of a female with cubs, the retreat of which she is solicitous to cover.

Its speed is said not to be very great, and it is asserted that a man may easily escape, especially in a willow grove, or in the midst of loose grass, where it stops for the purpose of reconnoitring. Dr. Richardson, however, "saw one make off with a speed that would have baffled the fleetest runner; and ascend a nearly perpendicular cliff with a facility that a cat might envy.' In the Fur Countries this species usually hybernates, selecting a spot under a fallen tree, where it scratches a hollow in the earth; here it retires at the commencement of a snow-storm, and the snow soon furnishes it with a close warm covering. Its breath makes a small opening in the snow, and the quantity of hoar-frost which occasionally gathers round the opening serves to betray its retreat to the hunter. In more southern districts, where the trees are larger, bears often shelter themselves in the hollow trunks. It has been observed by the Indians, that unless bears are very fat on the approach of winter, they do not hybernate; and as the males are often thin and exhausted in September, should the winter set in before they have time to recover their fat, they migrate southwards in search of food. So carefully do the females with young conceal themselves, that Dr. Richardson's numerous inquiries among the Indians of Hudson's Bay ended in the discovery of only one man who had killed a pregnant bear.

---

[*] A new species of Ox. Its skin was destroyed by rats

In the northern districts of America, as in Norway and other parts of the continent of Europe, the chase of the bear is followed up with the utmost ardour, nor will it surprise us to learn that an animal from which the Indian derives so much benefit (its flesh and every portion being in request), and which in the hour of combat is terrible, should be the subject of many superstitious observances, pardon being asked for its slaughter, to which necessity impelled the hunters, and every means taken to propitiate the offended spirit of the dead animal. Fig. 836 illustrates Bear-hunting by the Chippewayan Indians.

The Black Bear is subject to varieties of colour; its fur being sometimes of cinnamon tint, and sometimes of a still more yellow tone. Occasionally it is seen with a white throat-mark.

Cinnamon bears, as well as black, exist in the gardens of the Zoological Society.

837.—The Spectacled Bear

(*Ursus ornatus*). The Spectacled Bear, so called from the two semicircular marks of buff-colour extending from the muzzle and arching over each eye, is a native of the Cordilleras of the Andes in Chili. Its general fur is smooth, shining, and black: the muzzle is buff-coloured; the throat and chest are whitish. Of its habits nothing is known. Specimens exist in the gardens of the Zoological Society.

In the 'Zool. Proceeds.' for 1833, p. 114, is the notice of a bear, brought to Caraccas from the Andes, differing, according to Sir R. Ker Porter, in some points from the Ursus ornatus, of which it was evidently a mere variety.

838, 839, 840.—The Grisly, or Grizzly Bear

(*Ursus* (Danis) *ferox*). Ursus horribilis, Say; Mesheh Musquaw of the Cree Indians; Hohhost of the Chopunish Indians. This formidable species is a native of the Rocky Mountains and the district eastward of them. To the north it has been observed as far as sixty-one degrees of latitude: to the south it is said to extend as far as Mexico. Everywhere it is dreaded for its great strength and ferocity; even the huge bison falls prostrate before it, and the savage conqueror "drags the dark bulk along" (weighing a thousand pounds) to its haunt, and digs a pit for its reception, repairing to it as hunger dictates, till the whole is consumed.

Lewis and Clarke give the measurement of one of these bears as nine feet from nose to tail, but had seen them of larger dimensions. They attain the weight of eight hundred pounds. The length of the fore-foot is nine inches, of the hind-foot twelve, without including the enormous claws; its breadth seven inches. The tail is short, and lost in the shaggy hair. We query Lewis and Clarke's measurement of nine feet.

The Grisly Bear digs with great facility, but when adult is not capable of ascending trees; a fortunate circumstance for the hunter, for such is the animal's tenacity of life, that it seldom falls until it has received many balls. It would seem that though the adult Grisly Bears cannot climb trees, that the cubs are able, if the reports of the Indians are to be credited. The cubs, and females with young, hybernate; but the older males often come abroad during winter for food.

An individual of this species, distinguished by his enormous size and ferocity, some time since attracted the attention of all who visited the gardens of the Zoological Society. He had previously been about twenty years in the Tower, when, at the breaking up of the menagerie there, he was presented by his Majesty William IV. to the Society. His morose indomitable temper was never subdued, but remained unaltered, as if he had been at large surrounded by the savage rocks and gloomy pine-forests of his native regions.

841.—The Syrian Bear

(*Ursus Syriacus*). Though the bear is distinctly alluded to in the Scriptures (see 2 Kings ii. 23, et seq.; also 1 Samuel xvii. 34, et seq.) as a native of Syria, few travellers have noticed the existence of this animal in that country. Hasselquist omits it in his catalogue of the animals given in his 'Travels in the Levant;' nor is it recorded as a species by Desmarest, Fischer, or Lesson. It is in fact only recently, that naturalists have become aware that such an animal still prowled about the mountains of Lebanon.

Matthew Paris, however, in his 'England,' relates how Godfrey, during the siege of Antioch, rescued a poor man from the attack of a bear, which, turning upon the warrior, unhorsed him, having lacerated his steed, whereupon he continued the combat on foot, and, though he received a most dangerous wound, succeeded in burying his sword up to the hilt in his savage adversary, and killed him. ('Hist. Engl.,' t. ii. p. 34, fol. Lond. 1640.) Seetzen (a German traveller, in 1811) was informed in Palestine that bears existed in the mountains; and La Roque states that in his time they were tolerably abundant upon the higher Lebanon mountains, from which they descended at night in search of prey, and even occasioned apprehension to travellers.

Notwithstanding these casual notices, the animal remained in obscurity till brought before the scientific world by Emprich and Ehrenberg, who, in their 'Symbolæ Physicæ,' give the figure and description of a middle-aged female, killed near the village of Bischerre, in Syria, and which they dissected. They observe, that Mount Lebanon is crowned with two snowy summits, one called Gebel Sanin, the other Makmel, both of which they visited, but found bears only upon the latter, near the village of Bischerre, to the gardens of which they wander in winter, but in the summer remain in the neighbourhood of the snow. The individual killed was about four feet two inches long; her den, which they saw, was formed by great fragments of calcareous rock casually thrown together. The flesh of the animal was tasted, and found to be sapid, but the liver was sweet and nauseous. The gall is in great esteem; the skins are sold, and so is the dung, under the name of Bar-el-dub, the latter being used in medicine, and for diseases of the eye, in Syria and Egypt. The Syrian bear frequently preys on animals, but for the most part feeds on vegetables; and the fields of cicer arietinus (a kind of chick-pea), and other crops near the swowy region, are often laid waste by it.

The Syrian bear is of a uniform fulvous white (sometimes variegated with fulvous), the ears are elongated; the forehead is but slightly arched. The fur is woolly beneath, with long, straight, or but slightly curled hair externally; a stiff mane of about four inches long runs between the shoulders. It was evidently this species which figured in the procession of Ptolemy Philadelphus at Alexandria, and which is called by Athenæus (a Greek writer of Lower Egypt, contemporary with Commodus) a bear of white colour and large size (ἄρκτος μὲν λευκὴ μεγάλη μία); and which some, strange to say, have regarded as the Polar Bear from the shores of the Arctic Sea.

842.—The Thibet Bear

(*Ursus Thibetanus*). This species was discovered by M. Duvaucel in the mountains of Sylhet, and about the same time by Dr. Wallich in the Nepâl range. The neck of the Thibet bear is thick, and the head flattened, the forehead and muzzle forming almost a straight line; the ears are large; the body compact, and the limbs thick and clumsy; but the claws are comparatively weak. The general colour is black, but the lower lip is white, and a large Y-shaped mark of the same colour on the breast sends up its branch on each side in front of the shoulder. It is not of large stature. Fruits and other vegetable productions appear to constitute its principal food.

843.—The Malayan Bear

(*Ursus* (Helarctos) *Malayanus*). Bruang of the Malays. This species is found in Sumatra, and, with others of the subgenus Helarctos, is distinguished by the extensibility of the lips, the length and flexibility of the tongue, the shortness and smoothness of the fur, and the magnitude of the claws.

The Malayan Bear, or Sun Bear, is said to be a sagacious animal, and to display great fondness for sweets. The honey of the wild bees of its native forests is supposed to be a favourite food, and certainly its long slender tongue well adapts it for the reception of this delicacy. It feeds extensively on vegetables, and is said to be attracted to the vicinity of man by the young shoots of the cocoa-nut trees, to which it is very injurious; indeed Sir T. Stamford Raffles found those of the deserted villages in the Passuma district of Sumatra destroyed by it.

It is often kept domesticated, and is playful and familiar. Of one which lived two years in the possession of Sir T. Stamford Raffles, he writes:—"He was brought up in the nursery with the children, and when admitted to my table, as was frequently the case, gave a proof of his taste by refusing to eat any fruit but mangosteens, or to drink any wine but champagne. The only time I ever knew him to be out of humour was on an occasion when no champagne was forthcoming. He was naturally of an affectionate disposition, and it was never found necessary to chain or chastise him. It was usual for this bear, the cat, the dog, and a small blue mountain bird, or lory of New Holland, to mess together, and eat out of the same dish. His favourite playfellow was the dog, whose teasing and worrying was always borne and returned with the utmost good humour and playfulness. As he grew up he became a very powerful animal, and in his rambles in the garden he would lay hold of the largest plantains, the stems of which he could scarcely embrace, and tear them up by the roots."

The general colour of this bear is jet black, with the muzzle of a yellowish tint, and a semilunar white mark upon the breast. When adult it measures about four feet six inches along the back.

844.—The Bornean Bear

(*Ursus* (Helarctos) *euryspilus*). In general form, habits, manners, and colouring this species closely resembles the Sumatran bear; but is perhaps rather less, and has a large orange-coloured patch upon the chest; the fur is extremely close. In captivity it is playful and good-tempered.

The Bornean Sun Bear not only sits upon its haunches with ease, a position it usually assumes but can stand upright with great facility. Its senses, especially those of sight and smell, are very acute; the olfactory organs indeed appear to be in continual exercise. By various and amusing gestures it solicits food from spectators; and when a morsel of cake is held at a small distance beyond its reach, it expands its nostrils, protrudes its upper lip, and often its tongue, while with its paws it makes every effort to obtain the proffered delicacy. Having gained it, and filled its mouth, it places the remainder with singular coolness on its hinder feet, as if to keep it from being soiled by the floor, and brings it in successive portions to its mouth. It often places itself in an attitude of entreaty, earnestly regarding the spectators, and stretching forth its paws ready to receive their offering It is fond of notice, conscious of kind treatment, and delights to be patted and rubbed; but when vexed or irritated, refuses all attention so long as the offending person remains in sight.

Both this and the preceding species excel in climbing, and they are said to occasion much injury to groves of cocoa-nuts, both by climbing up them, and devouring the top shoot, thereby killing the tree, and also by tearing down the fruit, to the milky juice of which they are very partial.

845.—The Sloth-Bear

(*Ursus* (Prochilus) *labiatus*). Ours paresseux and Ours jongleur of the French; Aswail of the Mahrattas.

This uncouth animal was first described and figured (from the life) by Bewick, in his 'History of Quadrupeds,' without any name, but as an animal that had hitherto escaped the attention of naturalists. It was then (1791) taken for a sloth, and received from Shaw the names of Bradypus ursinus, and ursiformis; and from Pennant that of Ursiform Sloth. Blainville and others restored it to the genus Ursus; Illiger having previously founded the genus Prochilus for its reception, a name which is still retained in a subgeneric sense only.

The sloth-bear is a rough clumsy animal, with short massive legs, and huge hooked claws; and possessing great mobility of the snout. It inhabits the mountainous parts of India, and was observed by Colonel Sykes in Dukhun.

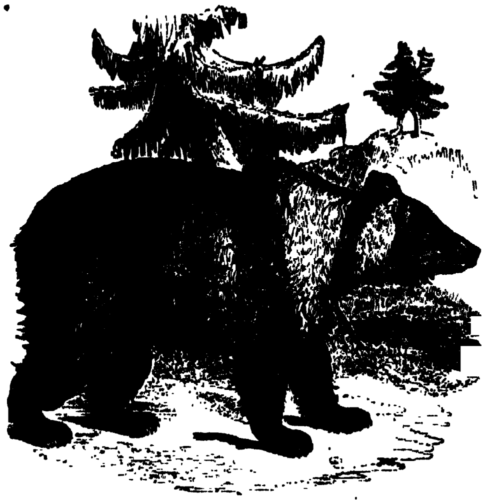
It dwells in caves, and its food is said to consist of fruits, honey, and termite ants, for the demolishing whose houses its claws are well adapted. It is said also frequently to descend to the plains, and commit great havoc on the sugar-cane plantations. On these occasions it becomes an object of pursuit to the Indian and European hunters.

The sloth-bear attains to nearly the size of the brown bear of Europe; it is robustly framed. The hair is remarkably long and shaggy; on the upper part of the head and neck it is sometimes twelve inches in length, and separates into two portions, one of which overhangs the eyes, imparting a peculiarly heavy appearance to the animal's physiognomy; while the other forms a thick mane across the shoulders. The general colour is black, intermixed with brown: a triangular mark on the breast is white. The head is carried low; the back arched; the muzzle, which is of a dirty yellowish white, is very much elongated; the lips are thin, flexible, and project at all times considerably in front of the jaws; and possess singular mobility, being capable of protrusion in a tubular form far beyond the muzzle, thus constituting an instrument of suction. The tongue is long, flat, and square at the extremity. We have seen the animal protrude his lips, while at the same time they were kept apart for several minutes

837.—Spectacled B·ar.

845.—Sloth Bear.

830.—Brown Bear.


832.—Siberian Bear.

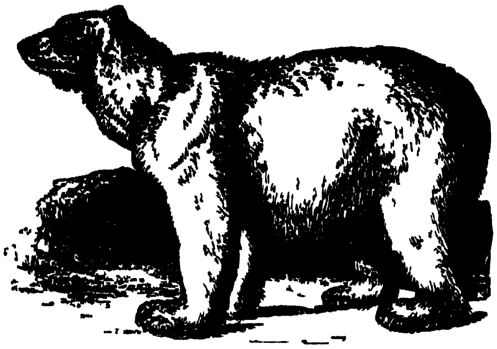
836.—Bear-hunting by the Chippewayan Indians.

840.—Grisly Bear.

841.—Syrian Bear.

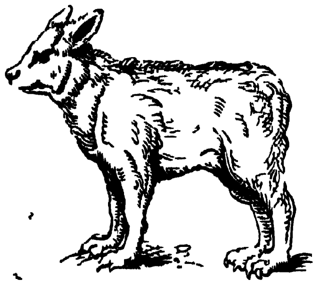
844.—Bornean Bear.

843.—Malayan Bear.

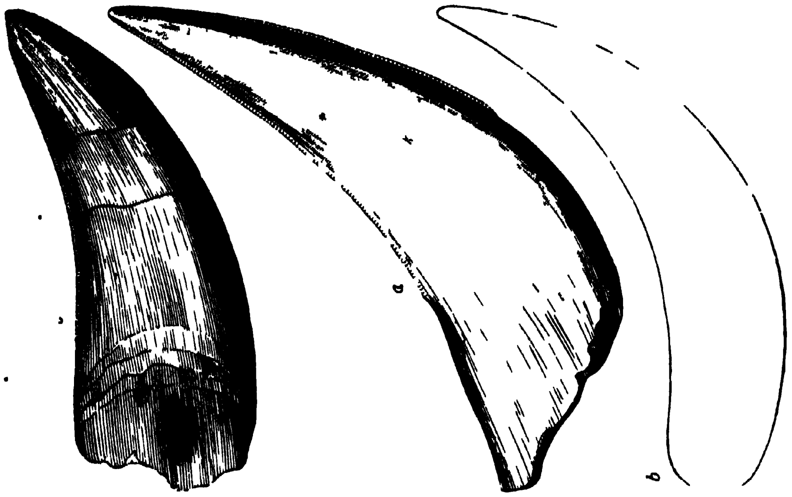


847 —Polar Bear

846 —Polar Bears and Seal

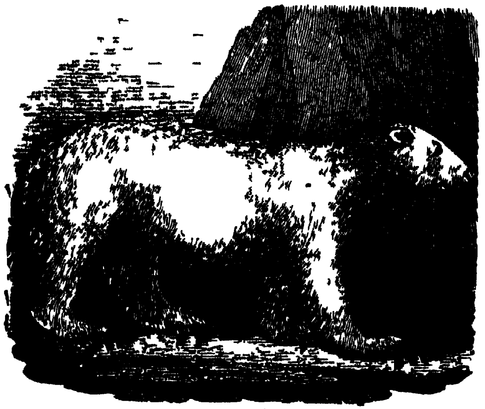


849 —Pretended Hybrid of Bear and Dog.



83 —a, Tooth of Machairodus, c, Megalosaurus.

842 —Thibet Bear



848.—Polar Bear

together, and on these occasions the interior of the mouth was distinctly visible.

A pair of these animals, which we have observed in captivity, were at times very playful, contending with each other, in rude sport, with great violence, struggling and endeavouring to throw each other down, and all the while uttering a loud roaring noise: at other times, huddled together, they passed whole hours in sleep. In India it is often led about by mountebanks and jugglers, as is the brown bear in Europe.

According to Captain Williamson ('Oriental Field-Sports') these animals are numerous on the boundaries of Bengal, which to the east and west are mountainous, rocky, and overrun with low underwood: their principal resort is under banks, in large burrows or natural cavities, but they do not hybernate. Their pace is shuffling and awkward, but quick enough to overtake a man on foot. They ascend trees with great facility.

The natives greatly dread them; the very sight of a bear, however distant, disheartens them, knowing, as they do, the strength and savage disposition of the sable shuffler. Of their ferocity, and the dilatory torments to which they subject their victim, Captain Williamson gives several horrible instances, observing, that they "will chew and suck a limb till it is a perfect pulp," not biting away the flesh, like most beasts of prey.

846, 847, 848.—The Polar Bear

(*Ursus* (Thalarctos) *maritimus*) Ours polaire of the French; Wawpusk of the Cree Indians, Nannook of the Esquimaux; Nennook of the Greenlanders.

Within the regions of the arctic circle dwells the Polar Bear, one of the largest and most formidable of the group. Formed to endure the most intense severity of cold, this monarch of a gloomy desolate realm prowls in sullen majesty over wastes of snow and among ice-glazed rocks in quest of food; he traverses fields of ice along the shore, clambers over rugged icebergs, or even swims out from floe to floe, or from island to island, ravenous for his prey. He dives with admirable address, and is capable of contending with his prey amidst the rolling waves. The seal forms its favourite diet, together with marine exuviæ, such as dead fishes and cetaceous animals; and he will attack even the walrus himself. In summer mountain-berries are eagerly sought for, nor are sea-weeds or marsh-plants rejected. Of the activity of this bear in the water we may form an idea from a statement by Cartwright, that he saw a polar bear dive after a salmon and kill his fish.

Captain Lyon gives the following account of its mode of hunting the seal:—"The bear, on seeing his intended prey, gets quietly into the water, and swims until to leeward of him, from whence, by frequent short dives, he silently makes his approaches, and so arranges his distance, that, at the last dive, he comes to the spot where the seal is lying. If the poor animal attempts to escape by rolling into the water, he falls into the bear's clutches; if, on the contrary, he lies still, his destroyer makes a powerful spring, kills him on the ice, and devours him at leisure." The same author informs us that this bear not only swims with rapidity, but is capable of making long springs in the water. Captain Sabine states that he saw one about midway between the north and south shores of Barrow's Straits, which are forty miles apart, though there was no ice in sight to which he could resort for rest.

The pace of this bear on shore is a kind of shuffle, but more quick than might be expected, and when at full speed as rapid as the sharp gallop of a horse.

The average length of the polar bear (which has been greatly exaggerated) is about six feet; but it occasionally attains to larger dimensions. Pallas describes an adult female six feet nine inches in length. The greatest length, from nose to tail, recorded by Captain Phipps, is seven feet one inch, the weight of the beast being 610 lbs. Captain Ross records the measurement of one seven feet ten inches, the weight being 1160 lbs.; and Captain Lyon, that one, which was unusually large, measured eight feet seven inches and a half, and weighed 1600 lbs.

It is stated on the best authorities, that the male does not hybernate, but that the female, on the approach of the severer season, retires to some rift among the rocks or ice, or digs a lair in the frozen snow; the falling snow drifts over the den, covering it to a great depth, a small aperture for breathing being always open. In this retreat, about the latter part of December, she brings forth two cubs, and in March quits the den with them, then about as large as a shepherd's dog, and prowls abroad, lean, gaunt, and ferocious; hunger and the presence of her offspring adding fury to her savage temper.

The male wanders about the marshes and adjacent parts until November; he then goes out to sea upon the ice in quest of seals, and becomes very fat. It often happens that he becomes drifted out from the coast on a floating field of ice; and in this way, says Dr. Richardson, polar bears are often carried from the coast of Greenland to Iceland, where they commit such ravages on the flocks, that the inhabitants rise in a body to destroy them."

Of the devotion of the female polar bear to her young, and of the danger attendant upon the chase of these animals, many travellers have made mention, and recorded various facts which came under their own observation. These, however, are so popularly current, that it is sufficient to allude to them.

It was not until Linnæus published the tenth edition of his 'Systema Naturæ,' that he had any idea that the polar bear was distinct from the brown bear, the only species he appears to have known. Martens, however, had previously distinguished it, and indeed was the first to characterize it from actual observation. ('Spitzbergische oder Gronlandische Reisebeschreibung,' Hamb., 1675.)

This species is of a more lengthened form than that of the others, the head is very much elongated and flattened, the ears and mouth comparatively small, the neck very long and thick, and the sole of the foot very large. The fur is silvery white, tinged with yellow: close, short, and even on the head, neck, and upper part of the back; long, fine, and inclined to be woolly on the hinder parts, legs, and belly. The sole of the foot is almost entirely covered with long hair, affording the animal a firm footing on the ice. The claws are black, not much curved, thick and short. Captain Lyon's crew found none of the terrible effects (skin peeling off, &c.) from eating the flesh, ascribed to it by some of the earlier voyagers.

849.—A Pretended Hybrid between a Dog and a Bear.

From time to time supposed hybrids of this sort have been exhibited, and there is generally an inclination to believe in the existence of creatures the offspring of such a parentage. That two animals so different in structure, dentition, general habits and instincts as the dog and bear should breed together is improbable—nay, contrary to the laws of nature and to physiology. We are not, however, surprised that at a time when a belief in monsters, both of the human and brute creation, was almost universal, that men of education should have credited the existence of a dog-bear.

Our figure is copied from a curious work, entitled 'Histoires Prodigieuses extraictes de plusieurs fameux Autheurs, Grecs et Latins, sacrez et profanes, divisées en cinq tomes, le premier par P. Boaistuau. Tome Premier, Paris, 1582.' It would appear that M. Pierre Boaistuau, who visited England in the reign of Elizabeth, and was introduced to the court, was shown two dogs, asserted to be of the parentage in question, both of which were presented to M. le Marquis de Trans: one this nobleman gave to M. le Compte d'Alphestan, the other, of which the figure is given by M. Boaistuau, he took to France. He describes the beast as extremely ferocious, and in form intermediate between the dog and bear, the latter being its male parent. There can be but little doubt that the bearwards palmed off these animals upon him and others as hybrids, but which were really dogs selected for their bear-like appearance, an appearance increased by cropping the ears and tail, and other skilful artifices.

The genus Ursus is rich in the reliquiæ of extinct species. These occur for the most part in various caverns in Germany, Hungary, and England, along with the bones of other Carnivora, as the wolf, hyæna, tiger, glutton, &c., and also of herbivorous animals, though these are less in number. In most of these caves (that of Kirkdale excepted, where the remains are principally those of an extinct species of hyæna) the bones of the bear tribe are the most prevalent. In the vast cavern of Gaylenreuth this is remarkably the case, the bones being referable to three distinct species which have been termed Ursus priscus, U. arctoïdes, and U. spelæus. They lie for the most part confusedly in a bed of animal earth, and are often encrusted with stalagmite, which lines the roof and walls of the cave. Though scattered and broken, these bones exhibit no tokens of having been rolled. Professor Goldfuss states that with regard to the cave of Gaylenreuth, if we assume 1000 buried individuals of the various species found there, the proportion will be as follows:—Hyæna spelæa, 25; Canis spelæus, 50; Felis spelæa, 25; Gulo spelæus, 30; Ursus priscus, 10; Ursus arctoides, 60; Ursus spelæus, 800.

Of these extinct bears, the skull of the Ursus spelæus is distinguished by the bold elevation of the forehead, and its size, which indicates the animal to have greatly exceeded any living species. The skull of the Ursus arctoides, though as large as that of U. spelæus, has the forehead much less elevated. The skull of Ursus priscus is smaller, and approaches in size and contour that of the common brown bear, but is more flattened along the upper surface.

It may here be observed that certain serrated canine teeth attributed to bears, under the names of Ursus etruscus and Ursus cultridens by Cuvier and others, and to the genus Felis by Bravard, are, according to Kaup, the relics of an animal allied to the Megalosaurus, one of the Saurian reptiles, but of a distinct genus, to which he has given the name of Machairodus. In Fig. 850, *a* is a tooth of Machairodus, natural size, imperfect below; *b* the outline of a cast of the perfect tooth; *c*, a tooth of Megalosaurus, natural size. Professor Owen, however, regards the teeth (*a*, *c*) as having belonged to a mammiferous animal, not however a bear, and the proof is afforded by the cast (*b*) which shows that the tooth was originally lodged in a socket, and not anchylosed to the substance of the jaw, and that the fang is contracted and solidified by the progressive diminution of a temporary formative pulp, and does not terminate in an open conical cavity, like the teeth of all known Saurians, which are lodged in sockets.

Genus *Procyon*.—Dental formula: Incisors $\frac{6}{6}$, Canines $\frac{1-1}{1-1}$, Molars $\frac{6-6}{6-6} = 40$. The two true molars on each side are equal, or nearly so; and the carnassière nearly resembles the true molars, not being suited to cutting flesh.

851, 852.—The Racoon

(*Procyon lotor*). Raton of the French; Mapach, Yllamaton, Maxile, and Cioatlamacazque of the Mexicans, according to Hernandez.

Notwithstanding Buffon's assertion to the contrary, the Racoon inhabits Canada as well as the warmer regions of America, its range being from about 50° north lat., extending through Mexico and the United States, and thence, as it would seem, into South America as far as Paraguay. In size these animals equal a common fox, having a stout body with moderate limbs, and a plantigrade, or rather semi plantigrade, walk, for though the sole is naked it is only when the racoon rests that it is totally applied to the ground. The toes, five in number, are armed with sharp claws; the muzzle is acute, the nose tapering beyond the lips, and flexible; the eyes are moderate, with a circular pupil, the ears are short, erect, and rounded, the whiskers long; the tail moderate, and somewhat bushy. General colour brownish grey, the tail being tinged with a blackish tint; muzzle dirty white; a black or dark-brown mark across the eyes and cheek, and another between the eyes, extending from the forehead; under parts pale grey.

The racoons are nocturnal in their habits, sleeping out the day in their holes, and prowling at night in search of food. The borders of the sea and the margins of swamps and rivers are their favourite localities, and they prey upon small animals, birds, eggs, and insects, adding roots, fruits, and sweet succulent vegetables to their diet. Nor are crabs, oysters, and other "shell-fish" less acceptable, for which they visit the shores at low water. To the partiality of the racoon for oysters we can ourselves testify, for some years since we repeatedly tried one of these animals with the hard-shelled mollusk in question, which it greedily devoured. Its first action was to crush the hinge of the shell between its teeth: which done, it wrenched the two valves so far asunder as to enable it to scrape out the mollusk with its claws.

In the description of a tame racoon by M. Blanquart des Salines, we are informed, "It opens oysters with wonderful skill; it is sufficient to break the hinge, its paws complete the work. It must have an excellent sense of touch. In this operation rarely does it avail itself of sight or smell; for instance, it passes the oyster under its hind-paws, then without looking seeks by its hands the weakest place: it there digs in its claws, forces apart the valves, and tears out the fish in fragments, leaving nothing behind." This was precisely what we ourselves witnessed.

The racoon is asserted to have the habit of dipping its food into water before eating it, whence it has received the appellation of lotor, or washer; but although we have had numerous opportunities of observing the animal in captivity, we never saw this mode of proceeding.

Though incapable of grasping objects with its paws, the racoon can hold its food between them pressed together, in doing which it usually sits upon its haunches like a bear, and in this attitude it very often feeds.

Of the senses of this animal, that of smell is the most developed, and is very acute: the eyes, though the pupil is round, are better adapted for twilight or night than for the glare of day; indeed, a strong light distresses and confuses these animals exceedingly. In its natural state, in fact, the racoon is nocturnal, and it is most probably from the circumstance of the eyes being incapable of sustaining daylight, that blindness from cataract (opacity of the lens) is so common in these animals in a state of captivity, when they are liable to be roused up and are often kept awake during the whole or greater part of the day.

The gait of the racoon on the ground is oblique, and when it moves quickly its mode of progression consists of a series of bounds, reminding us of the lemurs, but with nothing of their grace and lightness. When taken young this animal is easily tamed, becomes playful, and is fond of being noticed and caressed, but is at the same time very capricious and easily offended; and to some persons, without any apparent cause, it will show from the first marked signs of hostility. When enraged or desirous of attacking a person, the racoon advances, as we have often witnessed, with arched back and bristly hairs, and with its chin or under jaws close to the ground, uttering gruff sounds of displeasure. If once injured it seldom forgives its enemy.

It greedily attacks poultry within its reach, and is as cunning and destructive as the fox; though, according to M. Blanquart des Salines, it only devours their heads, which agrees with Dr. Richardson's observations.

When roused from its diurnal indolence, the racoon is restless, inquisitive, and prying; it climbs with the greatest skill, in the same manner as a bear, ascending and descending a tree, a pole, or branches fastened in its apartment, with the utmost address. It is apt to become very fat, and its flesh is said to be palatable. The fur is used in the hat manufacture, and the skins are imported in tolerable numbers.

Genus *Ailurus*.—Dental formula: Incisors $\frac{6}{6}$, Canines $\frac{1-1}{1-1}$; Molars $\frac{5-5}{5-5} = 36$. In dentition this genus approaches that of the racoons; but the molars have their crowns studded with sharp tubercles, which, as in General Hardwicke's specimen, become worn down by long usage. The molars of the upper jaw are broad and large, those of the lower jaw narrow. Fig. 853 represents the teeth of the Panda; *a* and *b* are the incisors, or front teeth, of the upper and lower jaw.

854.—The Panda

(*Ailurus fulgens*). The Panda is an inhabitant of the Himalayan Hills, between Nepâl and the Snowy Mountains, and was first discovered by General Hardwicke, who published a description in the fifteenth volume of the 'Linn. Trans.' Subsequently M. Duvaucel sent the skin of the animal to Paris, and a description and figure were published by F. Cuvier in the fifteenth number of the 'Histoire des Mammifères,' which appeared prior to the paper by General Hardwicke.

The Panda is a short-muzzled animal, covered with full soft fur, and having a tail of moderate length, resembling a lady's boa. In size the animal equals a badger, and is of a robust figure. Its limbs are stout: its feet five-toed; but the soles, instead of being naked, are covered with thick close wool of a pure white in some specimens, of a greyish white in others, forming a singular contrast to the deep black of the legs and under surface. The claws are short, sharp, and semi-retractile. Fig. 855: *a* represents the anterior foot, left side; *b*, the hinder foot, right side; *c*, the sole of one of the posterior feet, showing its woolly covering. The ears are short, pointed, and lined and tufted with white fur. The colour of the upper surface is beautiful fulvous red, the head being much paler; the muzzle is white, with a red dash beneath the eyes; the tail is banded red and yellow, but not very strongly; the limbs and under parts are abruptly black. The fur, which is very full and deep, consists of a woolly undercoat, with long soft hairs overlaying it.

We learn from General Hardwicke that the haunts of the Panda "are about rivers and mountain torrents." It lives much in trees, and feeds on birds and the smaller mammalia; it is frequently discovered by its loud cry or call resembling the word *wha*, often repeating the same; hence is derived one of the local names by which it is known. It is also called the Chitwa.

Genus *Nasua*:—

856.—The Brown Coati

(*Nasua fusca*). The Coatis, or Coati-mondis (Nasua), are restricted to the warmer regions of the American continent, and in dentition and general economy approximate to the racoons.

These curious animals, formerly placed by Linnæus with the Viverræ, cannot easily be confounded with those of any other group.

They may be known at once by the peculiar elongation of their snout, which projects considerably beyond the lower jaw. This snout is not, as in the hog, supported by a continuation of the nasal bone, but is a cylindrical and flexible proboscis, with a truncated extremity, forming a sort of disc where the nostrils open, and altogether giving a singular character to their physiognomy. They turn it about in various directions while in search for food, and root with it in the earth in quest of worms and insects. The eyes are small, but quick; the ears moderate and rounded; the body long, deep, and compressed; the tail long; the limbs short and stout; the toes five on each foot, and armed with large powerful claws, well adapted for digging. The fur is rather coarse, but long, full, and close; the tail is ringed with alternate bands of dark and pale tints—in the red coati (Nasua rufa) of rufous, in the brown coati (N. fusca) of dusky brown. The canine teeth are remarkable for their size and sharpness, especially those of the upper jaw, which are compressed, and have a cutting edge both before and behind.

In captivity these animals sleep much during the day, and are most active as the evening advances, at which time they traverse their cage, turn their snout from side to side, and pry into every corner. They do not, however, pass the whole of the day in sleep, but are active for hours together, retiring to rest only at intervals. Their temper is capricious: we have, indeed, seen some individuals tolerably good-tempered, but most are savage, and their bite is very severe.

In drinking, the coati laps like a dog; but as its long snout would be in the way during this operation, it turns it up, so as to prevent its being submerged.

These animals are highly gifted with the sense of smell; they examine everything with their long nose, which is in almost perpetual motion. Their temper is irritable and capricious;—they cannot be trusted, even by those with whose persons they are the most familiar, and consequently, are not to be touched without great caution. Their voice, seldom exerted, is, under ordinary circumstances, a gentle hissing; but when irritated or alarmed, they utter a singularly shrill cry, something like that of a bird. They defend themselves vigorously when attacked by a dog, or any animal, and inflict desperate wounds. Like the racoon, they are said to be fond of the juice of the sugar-cane, but we know not on what authority. Azara does not allude to this partiality; it is, however, far from being improbable. In climbing they descend head foremost, being in this respect unlike the bear, which animal they far surpass in activy, being indeed better climbers than even the cat, and exceeded among their own tribe only by the kinkajou, whose prehensile tail gives it a great advantage.

In their native climate they tenant the woods, living for the most part in small troops among the trees, which they climb with great address, and prey upon birds, which they surprise, rifling also their nests of eggs, or unfledged young. Worms, insects, and roots form also part of their diet.

The species presented in the cut is the brown coati (N. fusca). Its colours are very variable, the brown being more or less tinged with yellow, and sometimes shaded with black; the under surface is yellowish grey; the snout is generally black, and several spots or marks of greyish yellow encircle the eye. It is a native of Brazil, Guiana, and Paraguay.

Genus *Cercoleptes*.—Dental formula:—Incisors $\frac{6}{6}$, Canines $\frac{1-1}{1-1}$, Molars $\frac{5-5}{5-5} = 36$.

Fig. 857 represents the Teeth of the Kinkajou.

858, 859.—The Kinkajou

(*Cercoleptes Caudivolvulus*). Of the genus Cercoleptes one species only is known, the Kinkajou, Potto, Mexican Weasel, or Yellow Macauco of Pennant; the true affinities and situation of which in the system of mammalia seem sadly to have puzzled naturalists.

The kinkajou is a native of Southern and Intertropical America, where it appears to be extensively spread, and is known under different appellations. In New Granada it is called, by the native Indians, Gushumbi, and Manaviri in the mission of Rio Negro. In its manners it much resembles the coati-mondi (Nasua fusca), but differs from that animal not only in the shape of the head, which is short and compact, but also in having a prehensile tail. Of recluse and solitary habits, the kinkajou lives for the most part among the branches of trees in large woods or forests, and is in every respect well adapted for climbing: being, however, decidedly nocturnal, it is but little exposed to the observation even of those who sojourn among the places frequented by it. During the day it sleeps in its retreat, rolled up like a ball, and, if roused, appears torpid and inactive. As soon, however, as the dusk of evening sets in, it is fully awake, and is all activity, displaying the utmost restlessness and address, climbing from branch to branch in quest of food, and using its prehensile tail, to assist itself in its manœuvres. Few mammalia are more incommoded by light than the kinkajou: we have seen the pupils of the eyes contracted to a mere round point, even when the rays of the sun have not been very bright, while the animal at the same time testified by its actions its aversion to the unwelcome glare.

In size, the kinkajou is equal to a full-grown cat, but its limbs are much stouter and more muscular, and its body more firmly built. In walking, the sole of the foot is applied fairly to the ground, as in the case of the badger. Its claws are strong and curved, the toes on each foot being five. The ears are short and rounded. The fur is full, but not long, and very closely set. There is no animal among the Carnivora (as far as our experience goes) in which the tongue is endowed with more remarkable powers of extension. Among ruminating animals, the giraffe is, as we know, capable of extending this organ to a very great length, and of using it much in the same manner as the elephant does the extremity of his proboscis, drawing down by it the twigs and boughs of the trees, upon the leaves of which the creature feeds; in like manner can the kinkajou thrust forth its tongue, a long and slender instrument, capable of being inserted into crevices or fissures, in search of insects, reptiles, or the eggs of birds. Baron Humboldt informs us that this animal is an extensive devastator of the nests of the wild bee, whence the Spanish missionaries have given it the name of "honey-bear," and that it uses its long tongue to lick up the honey from the cells of the comb. In addition, however, to this food, birds, eggs, small animals, roots, and fruits constitute the diet of the kinkajou; and, as we have seen, it will draw these articles towards it with its tongue, when presented just within its reach. In drinking it laps like a dog, and also makes use of its fore-paws occasionally in holding food, and even in conveying it to the mouth, as well as in seizing its prey. In its aspect there is something of gentleness and good-nature; and in captivity it is extremely playful, familiar, and fond of being noticed. In its natural state, however, it is sanguinary and resolute.

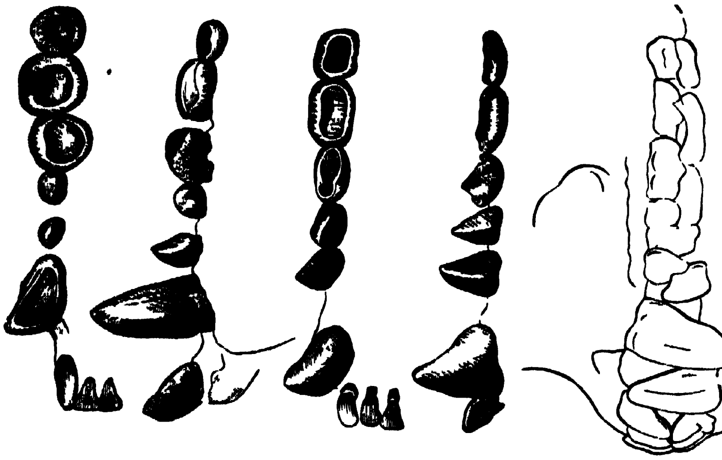
An individual of this species died at the gardens of the Zoological Society: it had lived in the possession of the Society about seven years, and was remarkable for gentleness and its playful disposition. During the greater part of the day it was usually asleep, rolled up in the inner partition of a box of its large cage; this, indeed, was invariably the case in the morning, unless purposely disturbed, but in the afternoon it would often voluntarily come out, traverse its cage, take food, and play with those to whom it was accustomed. Clinging to the top wires of its cage with its hind-paws and tail, it would thus suspend itself, swinging backwards and forwards, and assuming a variety of antic positions. When thus hanging, it could bring up its body with the greatest ease, so as to cling with its fore-paws as well as the hind pair to the wires, and in this manner it would travel up and down its cage with the utmost address, every now and then thrusting forth its long tongue between the wires, as if in quest of food, which if offered outside its cage, it would generally endeavour to draw in with this organ. It was very fond of being stroked and gently scratched, and when at play with any one it knew, it would pretend to bite, seizing the hand or fingers with its teeth, as a dog will do when gambolling with its master, but without hurting or intending injury. As the evening came on, its liveliness and restlessness would increase. It was then full of animation, traversing the space allotted to it in every direction, examining every object within its reach, rolling and tumbling about, and swinging to and fro from the wires of the cage: nor was its good-humour abated; it would gambol and play with its keepers, and exhibit in every movement the most surprising energy. In this state of exercise it would pass the night, retiring to rest on the dawn of the morning. The age of this individual is not ascertained; the state of its teeth, however, which are much worn down, shows it to have attained an advanced period; its colour was a pale yellowish grey, inclining to tawny—the hairs, in certain lights, have a glossy appearance. Its dissection after death fully confirmed the propriety of assigning it a place among the plantigrade Carnivora.

The Binturong (Arctitii Binturong, Temminck; Tetides ater, F. Cuv.) seems to take the place of the kinkajou in the forests of Java and Sumatra. These animals are prehensile-tailed and arboreal, and resemble the racoons in the principal details of their dentition. They live both on animal and vegetable food, and are particularly fond of plantains; they also eat eggs and birds.

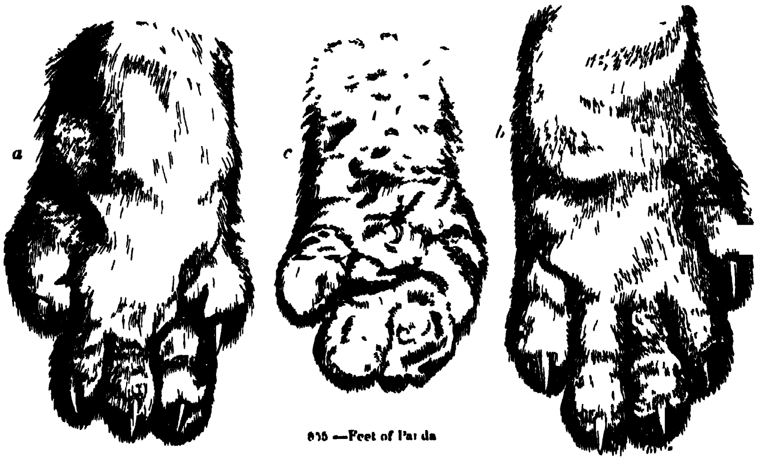
858.—Kinkajou.

854.—Panda

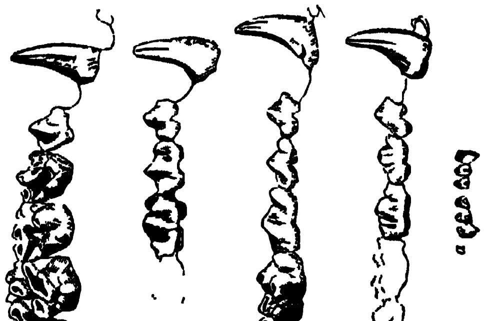
8 2.—Racoon



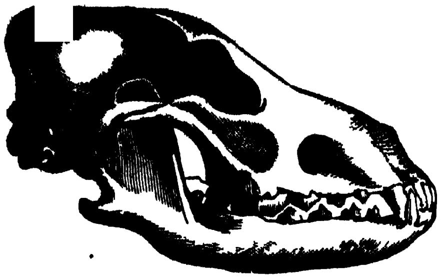
857.—Teeth of Kinkajou.



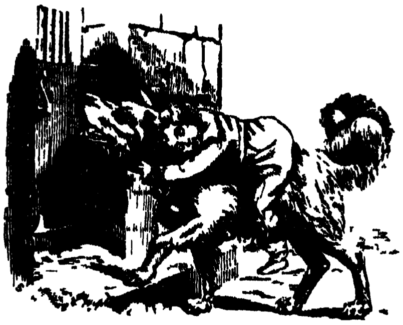
855.—Feet of Panda



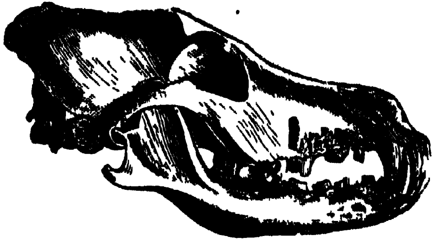
853.—Teeth of Panda



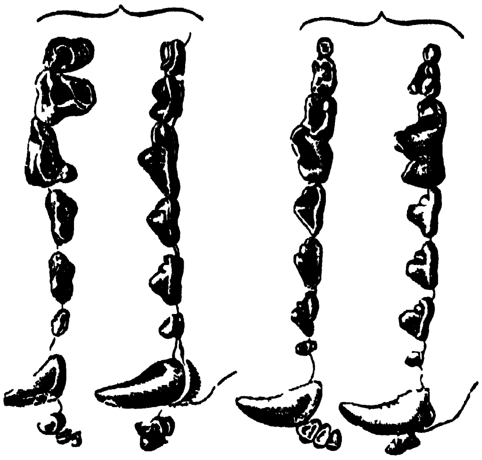
871.—Shepherd's Dog

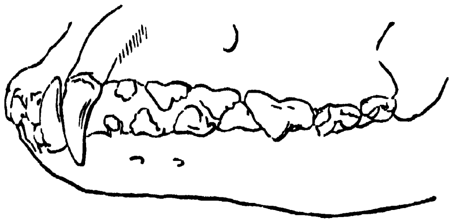


86 —Dog of Mount St Bernard



870 —Dingo

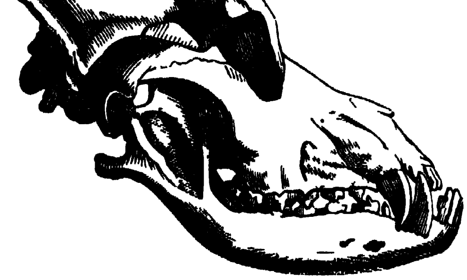




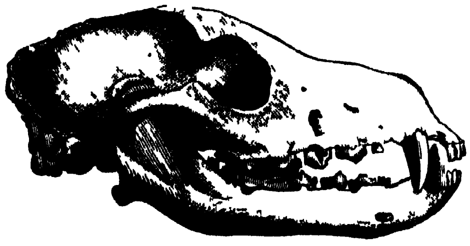
860 —Teeth of Dog

872 —Australian Dog

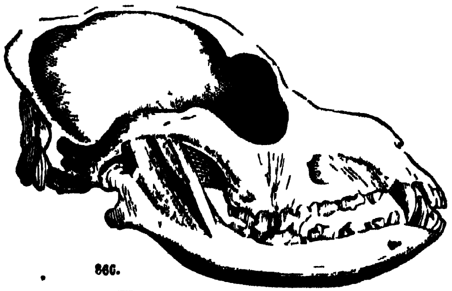
861.—Dogs



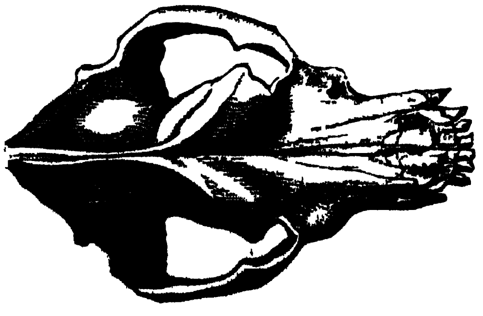
864

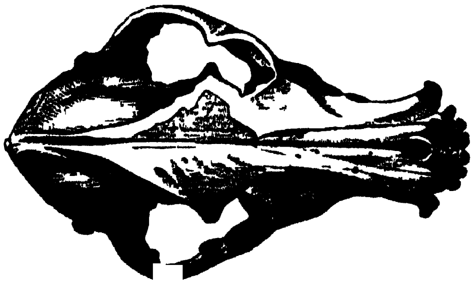


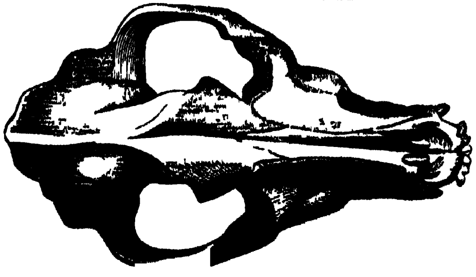
865.



866.







CANIDÆ (the Canine Family).

This family includes the Dog, the Wolf, the Jackal, the Fox, and the Lycaon; in other words, all those animals which Linnæus assigns to his genus *Canis*, and which, though agreeing in dentition, and in the digitigrade structure of the feet, may nevertheless with propriety be divided into subgeneric groups. In all the muzzle is elongated; the bony palate terminates in a line with the hinder margin of the posterior molars, in this respect differing from that of other Carnivora; and there are two true molars on each side both of the upper and lower jaw. The genus Megalotis, in the form of the lower jaw, in the dentition, and in the prolongation of the bony palate, offers an exception to the general rule.

Dental formula:—Incisors, $\frac{6}{6}$; Canines, $\frac{1-1}{1-1}$; Molars—false $\frac{3-3}{4-4}$, carnassières $\frac{1-1}{1-1}$, true $\frac{2-2}{2-2}$ = 42. The true molars below are small, the last being even minute, as is the first false molar, and often dropping out early. Fig. 860 illustrates the dentition of the dog.

Fore feet with five toes; hind feet with four toes, and sometimes a fifth on the tarsus; claws not retractile.

Genus *Canis*:—

861, 862, 863, &c.—The Dog

(*Canis familiaris*) Our 'Pictorial Museum' is rich both in skulls and examples of the races into which the domestic dog has ramified, and which are so numerous and interblended, as to present every variety of size, form, and disposition, from the high-bred greyhound or gigantic mastiff, to the puny cur or ill-formed mongrel.

Turning first to the skulls, we may observe that Figs. 864 and 865 represent the skull of the mastiff (Dogue de forte race) in two views; and it may be added that though the head is larger by a third or more than those of the shepherd's dog and spaniel, the cranial capacity is by no means so great. Figs. 866 and 867 show the skull of the spaniel (Barbet) in two views; Figs. 868 and 869, the skull of the Danish dog (Matin) in two views, Fig. 870, the skull of the half wild Australian dingo, may be contrasted with Fig. 871, the skull of the intelligent shepherd's dog.

It is with a feeling of something like hesitation that we enter upon the history of the dog, respecting whose origin few naturalists have an opinion in common, and which has given rise to many conjectures.

It was the opinion of Pallas that the dog is a factitious animal, that is, not descended from any single original wild stock, but from a mixture of nearly allied primitive species, whose hybrid offsprings have possessed prolific powers; and he observes that those domesticated animals which either do not intermix with other species, or which produce with others an unprolific progeny, are very little changed, however completely and anciently they have been under the dominion of man. When indeed we look at the great differences in instincts, form, and size which the domestic dog exhibits, we find it difficult to believe, interbreed as they may together, that all are the lineal descendants of one common origin. Yet is this opinion the most generally entertained. Mr. Bell even goes a step farther, and refers the domestic dog to the wolf as its primæval parent; some indeed have referred it to the jackal.

"In order," says Mr. Bell, "to come to any rational conclusion on this head, it will be necessary to ascertain to what type the animal approaches most nearly, after having for many successive generations existed in a wild state, removed from the influence of domestication and of association with mankind. Now we find that there are several different instances of dogs in such a state of wildness as to have lost that common character of domestication, variety of colour and marking. Of these, two very remarkable ones are the Dhale of India and the Dingo of Australia. There is besides a half-reclaimed race amongst the Indians of North America, and another also partially tamed in South America, which deserve attention; and it is found that these races in different degrees, and in a greater degree as they are more wild, exhibit the lank and gaunt form, the lengthened limbs, the long and slender muzzle, and the great comparative strength which characterize the wolf; and that the tail of the Australian dog, which may be considered as the most remote from a state of domestication, assumes the slightly bushy form of that animal. We have here then a considerable approximation to a well-known animal of the same genus, which, though doubtless descended from domesticated ancestors, have gradually assumed the wild condition; and it is worthy of special remark that the anatomy of the wolf, and its osteology in particular, does not differ from that of the dogs in general, more than the different kinds of dogs do from each other. The cranium is absolutely similar, and so are all or nearly all the other essential parts; and to strengthen still further the probability of their identity, the dog and wolf will readily breed together, and their progeny is fertile. The obliquity of the position of the eyes of the wolf is one of the characters in which it differs from the dogs; and although it is very desirable not to rest too much upon the effects of habit on structure, it is not perhaps straining the point to attribute the forward direction of the eyes in the dogs to the constant habit, for many successive generations, of looking towards their master and obeying his voice." Mr. Bell adds, as another corroborative circumstance, the fact that the period of gestation in the dog and the wolf is the same, sixty-three days, while in the jackal it is fifty-nine days.

The opinion of so eminent and judicious a naturalist is certainly entitled to great weight; but while we admit that Mr. Bell has made a strong case, we cannot but observe that several points are defective. In the first place, it is assumed that all wild dogs are the descendants of a domestic race; but though respecting some few this may be true, yet it by no means follows that the assertion applies to all: we may instance the Búánsú, or wild dog of Nepâl, described by Mr. Hodgson under the title of Canis primævus. This animal, which he believes to be the origin of the domestic dog, and not its descendant, ranges from the Sutlege to the Burhampootra, and seems to extend, with some immaterial differences, into the Vindyia, the Ghauts, the Nilgiris, the Casiah Hills, and the chain passing brokenly from Mirzapore through South Bahar and Orissa to the Coromandel Coast. "Of this race, although so wild as rarely to be seen, Mr. Hodgson has succeeded in obtaining many individuals. He is consequently enabled to describe not only the form and colours, but the manners also, which he does in great detail. Some of those he obtained produced young in captivity, having been pregnant when taken. The Búánsú, he observes, preys by night as well as by day, and hunts in packs of from six to ten individuals, maintaining the chase rather by its powers of smell than by the eye, and generally overcoming its quarry by force and perseverance. In hunting it barks like a hound, but its bark is peculiar, and equally unlike that of the cultivated breeds of dogs and the strains of the jackal and the fox. Adults in captivity made no approach towards domestication; but a young one which Mr. Hodgson obtained when it was not more than a month old, became sensible to caresses, distinguished the dogs of its own kennel from others, as well as its keepers from strangers; and on the whole, its conduct manifested to the full as much intelligence as any of his sporting dogs of the same age." ('Zool. Proceds.,' 1833, p. 111.)

In the same number of the 'Proceeds.' is the notice of a communication from W. A. Wooler, Esq., giving an account of a wild dog from the Mahablishwar Hills, in the Presidency of Bombay, and called there Dhale. The habits of this dog in a state of nature accord with those of the Búánsú of Nepâl, and with which animal it is most probably identical.

Colonel Sykes proves, we think, that the wild dog of the Dukhun, called by the Mahrattas Kolsun, is the same as the Búánsú of Nepâl, the skulls and external characters precisely agreeing. ('Zool. Proceeds.,' 1833, p. 133.)

Colonel Sykes observes, that this dog differs from any wild species hitherto described. Its head is compressed and elongated; its nose not very sharp; the eyes are oblique, the pupils round, the irides light brown. The expression of the countenance is that of a coarse, ill-natured Persian greyhound, without any resemblance to the jackal, the fox, or the wolf: and in consequence essentially distinct from the Canis Quao, or Sumatrensis, of General Hardwicke. The ears are long, erect, and somewhat rounded at the top; the limbs are remarkably large and strong in relation to the bulk of the animal, which is intermediate in size between the wolf and jackal; it hunts in packs, and in the stomach of one killed was found a portion of the Nylghau antelope. ('Zool. Proceeds.,' 1831, p. 100.)

Here then we have a genuine wild dog, called in the different mountain districts it inhabits, Búánsú, Dhale, and Kolsun, of a sandy red or rufous colour, and destitute of the last small molar of the lower jaw. Colonel Baber, in a note subjoined to Col. Sykes's description in the 'Trans. Asiat. Soc.,' states that it was often seen by him on the western coast, and in the Balaghât district, where it is numerous. "As often," he adds, "as I have met with them, they have invariably been in packs of from thirty to perhaps sixty. They must be very formidable, as all animals are very much afraid of them. Frequently remains of hogs and deer have been brought to me, which had been taken overnight by these wild dogs. The natives assert that they kill tigers and chetahs, and there is no doubt of the fact. It is quite correct that they are found in the Nilageris, though only in the western parts. I myself was followed, while travelling between the Paitera river and Naddibatt, a distance of eight or nine miles, by a pack of them; and had I not repeatedly fired off my pistols, they would certainly have carried away three or four terriers and Spanish dogs that were following me at the time. Two or three times I succeeded in getting young ones, but I did not keep them longer than three or four weeks, they were so very wild as well as shy. It was only at night that they would eat, and then most voraciously."

With respect to the Canis Quao of General Hardwicke, it is a red wolfish-looking dog in the Ramghur Hills; the Canis Sumatrensis is a wild dog of the same general characters, found in Sumatra, but with ears less acutely pointed.

From every account of wild dogs, it would appear that their colour is always sandy-yellow or red, a colour occasionally seen in animals of the domestic breeds. We do not, however, while we contend that these wild dogs are genuine, pretend to assert that any of them are the originals of any one of our domestic breeds; all we wish is to prove that there are genuine wild dogs, which fact being established, the necessity of looking to the wolf as the origin of the dog falls to the ground, for these wild dogs are not wolves.

Again, we have yet to learn, and experiment only can decide, that there is that pliability, that susceptibility of modification in the physical and moral nature of the wolf, which will permit of its conversion into the mastiff, the setter, the greyhound, and the spaniel.

In the next place, though the wolf and dog will breed together, their progeny, if fertile, as Buffon seems to prove, is so in a low degree only, the mixed race gradually failing, and becoming extinct; but granting the contrary, nothing is proved, because, whatever naturalists may say, there is reason to believe that closely allied species (there are degrees of affinity) will interbreed and produce a permanently mingled stock.

Moreover, we have yet to be shown a race of true wolves, the descendants of dogs which have returned to their natural condition, and reassumed their genuine characters. If the wild dogs which we have described, and which we regard as genuine, be really the descendants of a domestic stock, even then, seeing that they have resumed their original characters (as evidenced by their uniformity of size, figure, colour, and instincts), the argument that the wolf is the primæval type of the dog is at once nullified: for, as we have said, these rufous wild dogs are distinct from the wolf. While we thus venture to question the theory entertained by Mr. Bell and other eminent naturalists, we are not prepared to point out the origin or origins of the domestic dog; and we venture to say that the subject will always remain a Gordian knot, which science will never unravel. Buffon has eloquently observed, that "those species which man has greatly cultivated, whether belonging to the animal or the vegetable world, are, beyond all, those which are the most altered; and as the alteration is sometimes to such a degree that we cannot recognise in them any thing of their primitive form (such being the case with wheat, which has no resemblance to the plant from which it is supposed to have derived its origin), it is not impossible that among the numerous varieties of the dog which we see in the present day, there is not one which bears a resemblance to the original type, or rather, to the first animal of the species."

If we pass from dogs confessedly wild to those which are half-wild, only semi-domesticated, the Dingo, or Australian dog, is one of the most remarkable and best known. Of the origin of this dog, and of the circumstances connected with its introduction into Australia, we are totally ignorant. We know that wild packs exist there in the remoter districts, the scourge of the country, preying on the native kangaroo, and making havoc among the flocks and herds of the European settlers. So wolf-like are these dogs in general form (though they are specifically distinct from the wolf), that the first navigators who touched at New Holland scarcely recognised them as dogs. Dampier, in the account of his voyage performed in 1699, states that his men saw two or three beasts like hungry wolves, and the similarity is to a certain degree very striking. The domestic breed, if domestic it can be called, in all respects resembles those which are completely emancipated.

The Dingo, called Warragal by the natives, is about as large as a harrier; its body is firmly built, its limbs muscular; its head is broad between the ears, and its muzzle is acute; the neck is thick and powerful; the ears are short, pointed, and erect; its tail, which is rather long, is somewhat bushy and pendulous, or at most raised only horizontally. The general colour is sandy-red; the eyes are rather small and oblique, and have a sinister expression. It is not found in Van Diemen's Land.

The agility and muscular powers of the dingo are extraordinary, and its cunning and ferocity are as much so. It never barks, but howls loudly; as far as we have observed, it never evinces pleasure by wagging the tail. A dingo bred in this country came some few years since under our personal observations; it was about six weeks old when removed from the mother. On putting the young animal into a room, it immediately skulked into the darkest corner, and there crouching, eyed us with looks of great distrust and aversion; as soon as left to itself, it commenced the most melancholy howling, which ceased on any person's entrance. This for some days was its constant practice, and when placed in a kennel the greater part of the day was thus employed. It grew up strong and healthy, and gradually became reconciled to those from whom it was accustomed to receive food, but was shy towards others, retreating into its kennel at their approach. It never barked, nor, like other dogs, gave notice of the approach of strangers, and therefore as a guard was perfectly useless. A great part of the day was spent in howling, and that so loudly as to be heard at the distance of more than half a mile. When the moon rose brightly, it would sit and utter for hours its wild lamentations, not a little to the annoyance of the neighbourhood. With all its shyness, it was at the same time savage, but would never make an open attack; several times it snapped at persons who happened to be walking within its reach, but only when their backs were turned, and it immediately retreated again into its kennel. So great was its strength, that though encumbered by a heavy chain, it leaped a wall of considerable height, and was not secured without difficulty. Fig. 861, *b*, Figs. 872 and 873, represent the dingo.

We have lately seen a small dog from the Niger, where it is domesticated, very nearly resembling in form the dingo, but on a much more diminutive and lighter scale, and with a longer muzzle in proportion; its general colour was reddish. It neither barked nor wagged its tail, at least when first obtained, but if we mistake not, it subsequently learned the latter, if not both, of these canine accomplishments.

Among the wild races of dogs, or rather of dogs become wild, to which Buffon alludes, are those of South America and the West Indian Islands, confessedly sprung from a European stock abandoned by the early settlers in the vast plains, and which have given origin to an unreclaimed race. Azara states that these dogs are called Yagoua (a name given also to the jaguar) in Paraguay, where they are very common, inhabiting caves. They formerly abounded in Hayti, Cuba, and all the Caribbean islands, but are now extirpated there. Mr. Darwin alludes to wild dogs in Banda Oriental as attacking sheep. According to Oexmelin these dogs resemble the greyhound; but others more accurately describe them as having the head flat and elongated, the muzzle sharp, the body slender, the general aspect wild and savage. They are strong and active, and hunt their prey in packs.

It would appear, however, that the Europeans on their arrival found native dogs both in the Caribbean Islands and in Peru. "Those belonging to the savages of the Antilles," says Buffon, "had the head and ears very long, and resembled a fox in appearance." (See 'Hist. Gén. des Antilles,' par le P. du Tertre, Paris, 1667.) He also adds that the Indians of Peru had a large and a smaller kind of dog, which they name Alco, and that those of the Isthmus were ugly, with rough long hair and erect ears.

With respect to the Alco of Peru and Mexico, we know nothing more about it than what Dampier and Fernandez mention. The latter describes two breeds, viz. the fat Alco, or Michuacaneus, called by the natives Ytzcuinte porzotli, and the broad-footed Alco, or Techichi. Both were small, some of the latter race not much exceeding a guinea-pig in size. The head was small, the back arched, the body thick, the ears pendulous, and the tail short. An individual probably of this race was brought to this country from the neighbourhood of Mexico, by Mr. Bullock; it was white, variegated with black and reddish yellow; this specimen was procured in the mountains of Durango, where it bore the name of Acolotte. It died in a few days, and its stuffed skin formed part of the collection exhibited in Piccadilly, being placed under a glass with a huge bull-frog, which equalled it in size. These specimens are, we believe, now in the possession of Mr. Leadeater. Dogs resembling the Alco were seen as early as 1492 in several of the West Indian Islands, by Columbus, and were also found in Martinique and Guadaloupe, in 1635, by French navigators, who describe them as resembling the little Turkish or Barbary dogs without hair, adding that they were eaten by the inhabitants. All trace of them is now lost.

The probability is that these Alco dogs were not indigenes of the soil either in the islands or on the continent of Peru, but were brought by some of the tribes by whom South America was populated. The breed might have been introduced by that strange people (of Malay descent?) who founded the Peruvian and Mexican empires. In the South Sea islands, dogs of a similar race exist, which are fed on vegetable food, and eaten, as were the Alco dogs in South America.

Wild dogs exist in Congo, Guinea, and other parts of Africa, hunting in packs, and dwelling in caves or burrows. Clapperton met with them in the country beyond Timbuctoo. In the island of Teneriffe, a large wolfish breed of dogs is domesticated and valued for the chase.

Fig. 874 presents the portraits of a leash of fine hounds from Africa, by Major Denham, who had employed them in hunting the gazelle, in the chase of which their exquisite scent and extraordinary speed were displayed to great advantage; they would frequently quit the line of scent for the purpose of taking a direct, instead of a circuitous course (sportsmen call this cutting off a double), and recover the scent again with wonderful facility. These beautiful hounds were consigned to the Tower menagerie, where, shut up in a close den, they evidently felt miserable. Instead of exerting their energies in pursuit of the antelope on the plains of Africa, here they were prisoners, with no means of escape, and with no room or opportunity for the exercise of their powers and instincts. These hounds, however, were not of the wild breed; in symmetry and action they were perfect models, and in temper were gentle, excepting that confinement rendered the female irritable. Other representations of the African hound are given in Figs. 875 and 861, *f*.

To the group of dogs which in their aspect and physiognomy retain a marked air of wildness, as indicated by the sharpness of the muzzle, the erect or semi-erect position of the ears, and the oblique direction of the eye,* giving an air of cunning and distrust to the countenance, is to be referred the Esquimaux dog, Fig. 861, *a*, and Fig. 876. In general aspect, the Esquimaux dog (Canis familiaris, var. borealis), so closely resembles the wolf of its native regions, that when seen at a little distance it is not easy to distinguish between them; so much so indeed, that Sir Edward Parry's party during their second voyage forbore to fire upon a pack of thirteen wolves, which had closely followed some Esquimaux, lest they should commit an irreparable injury upon these poor people by destroying their faithful and powerful allies.

Those visiting the museum of the Zoological Society and looking at a fine specimen of the Esquimaux dog (No. 212, *d*, of Catal. Mamm. 1838) which is placed near a grey wolf from the high northern parts of America (No. 214, Cat. Mamm.), might suppose, unless informed to the contrary, that the two animals were of the same species. In both the fur is deep and thick, both have the same erect ears, the same breadth of skull between them, and the same or nearly the same sharpness of muzzle. In addition we may state that, in its native wilds at least, the voice of the dog is not a bark, but a long melancholy howl.

In the dog, however, the tail is more bushy than in the wolf, and is carried in a graceful curve over the back, while in the wolf it hangs down between the legs. It is further to be remarked that the antipathy of the Esquimaux dog to the wolf is inveterate; these animals not only regard the wolf as an enemy, but fear it, and though they attack the bear with undaunted energy, they never, unless impelled by necessity, venture to assault the wolf. Often, indeed, they fall a sacrifice to this beast of prey, and are carried off even in sight of their owners.

To the Esquimaux their dogs are of the greatest importance; to these faithful slaves they look for assistance in the chase of the seal, the bear, and the reindeer; for carrying burdens, and for drawing them on sledges over the trackless snows of their dreary plains. In summer, a single dog carries a weight of thirty pounds in attending his master in the pursuit of game; and in winter six or seven dogs, yoked to a heavy sledge, with five or six persons, or a load of eight or ten hundred-weight, will perform a journey of forty or fifty miles a day. On good roads they will travel this distance at the rate of eight miles an hour for several hours together; but on untrodden snow, twenty-five or thirty miles would be a fair day's journey. The same number of dogs well fed, with a weight of only five or six hundred pounds, that of the sledge included, are almost unmanageable, and on a smooth road will go at the rate of ten miles an hour. While thus travelling, should they scent a reindeer even a quarter of a mile distant, they gallop off furiously in the direction of the scent, and soon bring the game within reach of the arrow of the hunter. So acute, indeed, is their sense of smell, that they will discover a seal-hole by it entirely, at a very great distance.

The average height of the Esquimaux dog is one foot ten inches; generally the colour is white with something of a yellow tinge, but some are brindled, some black and white, and some black.

If the Esquimaux dog resembles the grey wolf of North America, equally does the Hare Indian's or Mackenzie River dog resemble the fox. This dog (Canis familiaris, var. lagopus) is characterized by a narrow, elongated, and pointed muzzle, by erect sharp ears, and by a bushy tail, not carried erect, but only slightly curved upwards, and by the general slenderness of the form. (Fig. 877.) The hair is fine and silky, thickening in winter, when it becomes white or nearly so; but in summer it is marked by patches of greyish black or slate-grey, intermingled with shades of brown. So nearly does this dog resemble the arctic fox of the regions where it is found (namely, the banks of the Mackenzie River and of the Great Bear Lake, traversed by the arctic circle), that they have been considered merely as varieties of each other, one being of the wild, the other of the domesticated race. The Hare Indian's dog is never known to bark in its native country, and the beautiful pair brought to England by Sir John Franklin and Dr. Richardson never acquired this canine language; but one born in the Zoological Gardens (the pair in question having been presented to the Society) readily learned it, and made his voice sound as loudly as any European dog of his size and age.

This variety is of great value to the natives of the bleak and dreary realms where the moose and the reindeer are objects of the chase. Though it has not strength fitting it for pulling down such game, yet its broad feet and light make enable it to run over the snow without sinking if the slightest crust be formed on it, and thus easily to overtake the moose or reindeer, and keep them at bay until the hunters come up. In the fox the pupil is oblong, in the dog circular; but independently of this, it is, to say the least, highly improbable that this intelligent dog is specifically identical with the arctic fox: but if for argument we grant that it is, as some contend, and also that the Esquimaux dog is identical with the wolf, other dogs also being reclaimed wolves, we are involved in a dilemma; for we must then admit that the wolf and fox will breed together and produce a fertile offspring, which those who contend for the wolfish origin of the dog by no means will allow to be possible.

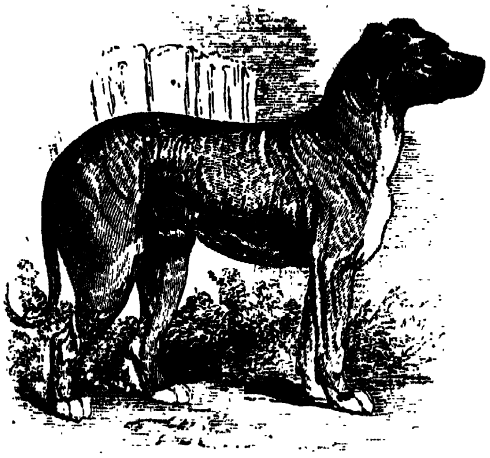
The Pomeranian or wolf-dog (chien-loup) and the Siberian dog, the Lapland dog, and the Iceland dog, of Buffon, appear to be closely related to the Esquimaux dog. Buffon regards them as varieties of the shepherd's dog, which he considers to be that which of all is nearest to the primitive type, since, as he observes, in all inhabited countries, whether men be partially savage or civilized, dogs resembling this more than any other are spread: and he attributes its preservation to its utility, and its being abandoned to the peasantry charged with the care of flocks. If, however, great cerebral development and intelligence are to be received as tests of cultivation, we should be inclined to regard the shepherd's dog as one of the most remote from the original wild type, sharp and pointed as are its nose and ears. (Figs. 878 and 862, *f*.) The forehead rises, the top of the head is arched and broad between the ears, and the hair is long and sometimes matted. This dog is of middle size, but light, active, and strong.

Of the sagacity and faithfulness of the shepherd's dog many interesting narratives are current; it knows its master's flocks, it will single out a sheep under his direction, keep it separate, or disengage it again from the rest of the flock, should it regain or mingle with them; it will keep two flocks apart, and should they coalesce, re-divide them. It will watch and defend them from strange dogs or foxes, and will drive them to any place required. It is in fact the shepherd's friend and assistant; it watches every look and every sign, is quick in apprehension, prompt in obedience, and pleased with its master's praise: and well does he who tends his flocks on the wide pasture-lands or mountain districts of our island appreciate the services and fidelity of his attached ally.

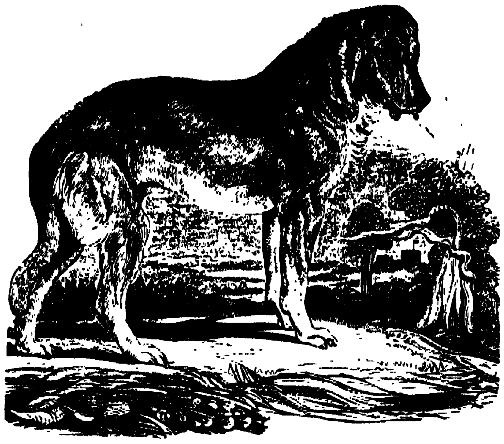
Closely allied to the shepherd's dog is the cur or drover's dog; it is generally larger than the former, with shorter hair, and stands taller on the limbs. The tail is mostly cut short, but Bewick says that many are whelped with short tails, which seem as if they had been cut, and these are called in the North "self-tailed dogs." Though this writer thinks the drover's dog to be a true or permanent breed, it seems to us that it is a cross between the shepherd's dog and some other race, perhaps the terrier.

---

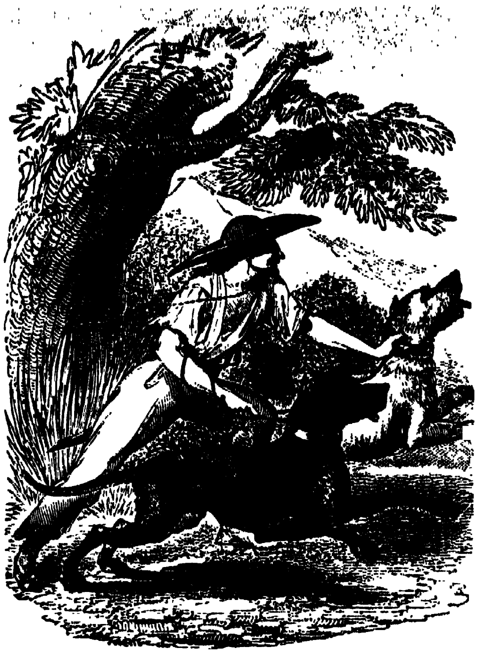
* An oblique direction of the eye is one of the diagnostics of a low degree of cultivation, and is never seen in what are termed high-bred races, however produced be the muzzle—as the greyhound.



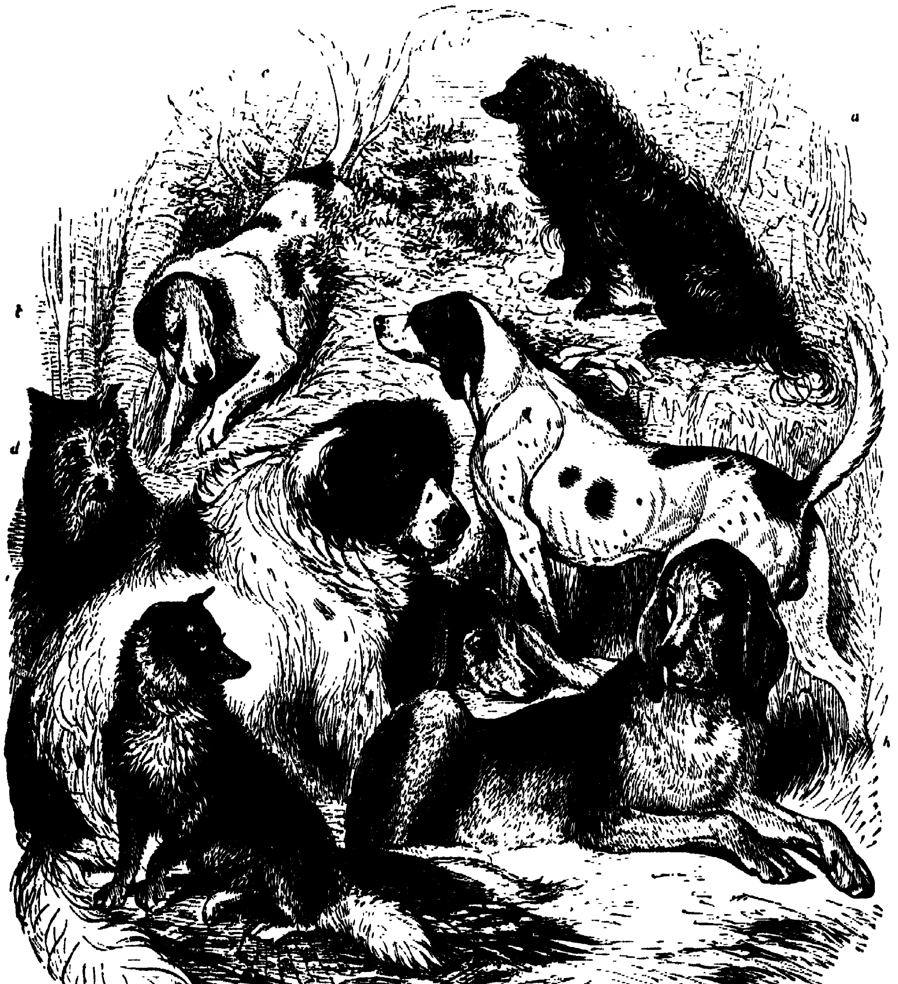
891.—Cuban Blood-hound.



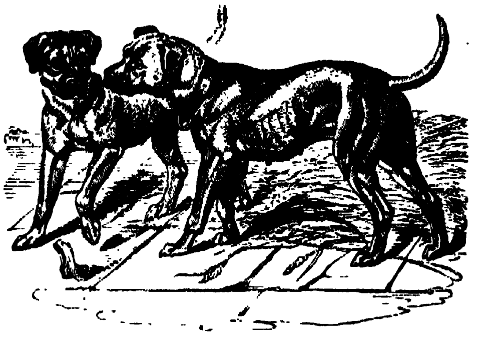
888*.—English Blood-hound.



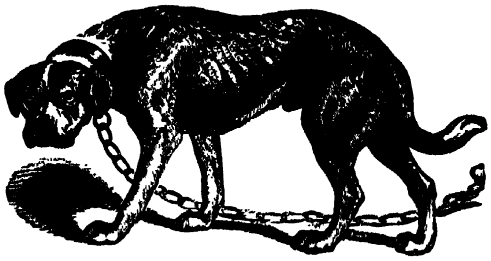
889.—Cuban Blood-hounds.



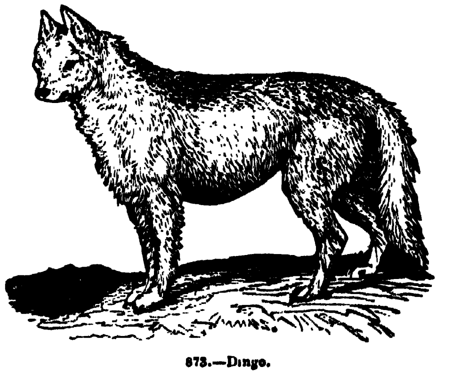
862.—Dogs.



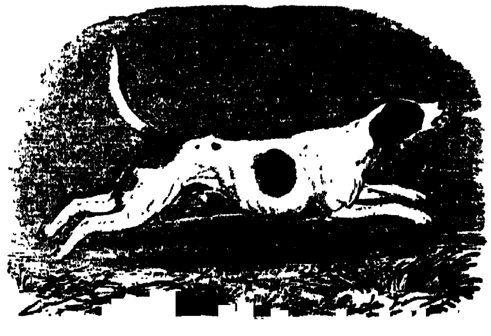
890.—Cuban Blood-hounds.

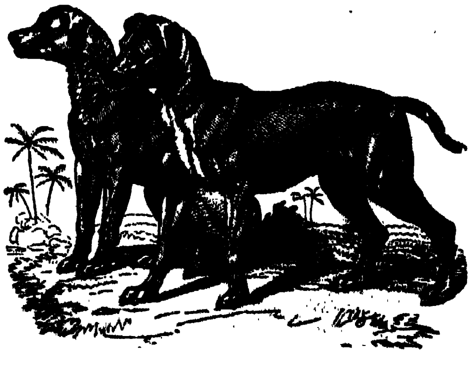


892.—Mastiff.



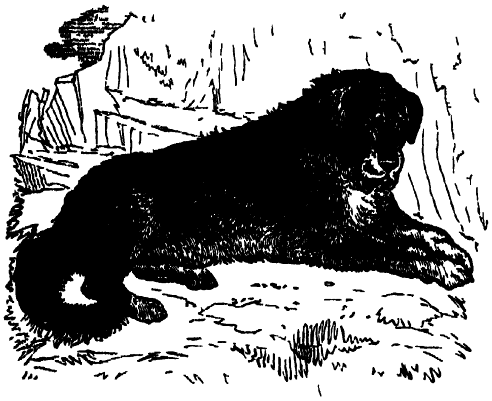
873.—Dingo.





877.—Dog of Mackenzie River

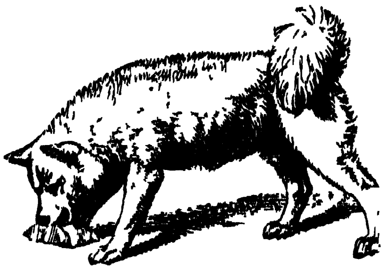
863.—Dogs



893.—Thibet Watch dog.

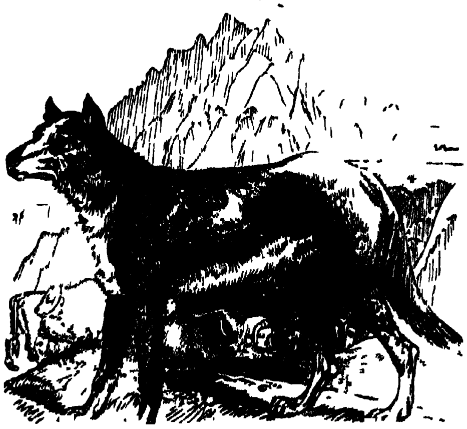
885.—Arabian Greyhound.

881.—Street Dogs of the East



876.—Esquimaux Dog

898.—Lion and Spaniel



These dogs bite severely, and always attack the heels of cattle, and, as they are prompt, courageous, and intelligent, a fierce bull is easily driven by them.

Supposing the shepherd's dog to be the representative of a small section of the domestic canine race, the next to which we may turn is that of the terriers. Two breeds of this spirited and well-known dog are common: one called the Scotch Terrier, with rough wiry hair, short legs, and a long body; the other, called the English Terrier, sleek, with longer legs and a more elegant form; its ordinary colour is black with tanned limbs, and a tanned spot over each eye. In both the muzzle is moderately long, and sharp, and the ears erect; the eye is quick, and the power of smell acute; for unearthing the fox or badger, for worrying rats, and for courage and determination, these dogs are celebrated; and they make excellent house-guards. Who is not familiar with the pepper-and-mustard breeds, as depicted by the graphic pencil of Sir Walter Scott? (See Figs. 879, 880, 881.)

Fig. 879 represents very spiritedly three of these dogs engaged in the occupation of rat-catching, and evidently entering into the sport with the utmost ardour, encouraged by their professional director, who holds in his hand their assistant the ferret, which they have learned to regard as their ally.

The Lurcher (Fig. 862,) *d* appears to be a mixed breed between the rough terrier or shepherd's dog and the greyhound. Bewick informs us that it is shorter than the latter, with stronger limbs, and is covered with a rough coat of hair, commonly of a pale yellow colour. As this dog possesses the advantage of a fine scent, it is often employed in killing hares and rabbits in the night time. It steals silently and cautiously upon them while they are feeding, and then suddenly darts forward and seizes them.

The Greyhound (Fig. 861, *d*, and Fig. 882, the Scotch greyhound; Fig. 861, *e*, the English) is the example of a distinct group: Buffon regards the French Mâtin and the great Danish dog as the main stocks of the greyhound race; but this is not clear. In Scotland and Ireland there existed in very ancient times a noble breed of greyhounds used for the chase of the wolf and the deer, and which appears to us to be the pure source of our present breed; it is quite as probable that the mâtin is a modification of the ancient greyhound of Europe, represented by the Irish greyhound or wolf-dog, as that it is the source of that fine breed. Few, we believe, of the old Irish greyhound exist. In Scotland the old deer-hound may still be met with, and though it exceeds the common greyhound in size and strength, it is said to be below its ancient standard. With the extirpation of the wolf the necessity of keeping up the race to the highest perfection ceased. The hair is wiry, the chest is remarkable for volume, and the limbs are long and muscular. A similar breed existed and still continues to exist in Albania, and was celebrated by the ancients for its prowess. In England the greyhound was larger and stronger formerly than at present, and employed in chasing the stag. Queen Elizabeth was gratified one day after dinner by seeing from a turret sixteen deer pulled down by greyhounds upon the lawn at Cowdrey Park in Sussex. The Italian greyhound is well known as an elegant attendant of the parlour.

In Arabia, Persia, and other parts of the East, a breed of greyhounds has existed time immemorial; these dogs strongly resemble light coursing dogs represented in Egyptian paintings, and are probably descended from them; of the same type are the semi-wild unowned street-dogs of Egypt, Syria, and South-western Asia. From the antiquity of the greyhound breed, we might be induced to suppose that in it is to be seen the nearest approach to the primitive source, or one of the primitive sources of the reclaimed race, and perhaps the Arabian greyhound or the lurcher-like street-dogs of Egypt retain some characters in common with the primitive stock. (Figs. 883 and 884.) Care and attention have elevated the British greyhound far above the ancient Egyptian coursing dog, or that of Arabia (represented by Fig. 885), of which the form of the head is wolfish, the tail fringed with long hair, and the ears, as seen in the paintings of the ancient Egyptians, erect and very acute. Fig. 886 is a sketch of the Turkman watch-dog for guarding sheep. It is described as a large, rugged, fierce animal equalling the wolf in stature, shaped like the Irish greyhound, and with equally powerful jaws. The ears are erect, the tail rather hairy, the general colour deep yellowish red. This race is of great antiquity, and doubtless still retains much of its pristine aspect, which is so wolf-like, that, according to Colonel Hamilton Smith, "a friend being present in Asia Minor at a wolf-hunt, allowed one (a wolf) to pass out of a brake, because he mistook him for one of the Turkman dogs."

Of the races with pendent ears and a moderately lengthened muzzle, we may first advert to the spaniels, among which we include the pure setter and the rough water-dog. These dogs are remarkable for intelligence, docility, and their affectionate disposition. The fur is long and silky, sometimes curled or crisped, the ears are large and pendent, and the expression of the countenance is spirited, yet gentle and pleasing. All possess excellent scent, especially the setter, formerly so valued by the sportsman.

The water-spaniel is extremely useful to persons engaged in the pursuit of water-fowl; it swims well, is very hardy, and is an excellent retriever. (Fig. 862, *a*.) The French poodle may be referred to the spaniels: it appears to be very nearly allied to the rough water-dog figured by Bewick, the "grand barbet" of Buffon, and of which there is a smaller variety termed "le petit barbet."

The rough water-dog is a most intelligent animal; it is robustly made, and covered universally with deep curly hair; it exceeds the water-spaniel in size and strength, but has the same aquatic habits and docility. It is much used as a retriever by the shooters of water-fowl.

We are inclined to consider the Italian wolf-dog (used in the Abruzzi by the shepherds to defend their flocks), the Newfoundland and Labrador dog, and the Alpine dog, as the representatives of a distinct group; the latter dog, indeed, approximates to the mastiffs. We have seen several noble specimens of the Alpine or St. Bernard breed: their size is equal to that of the largest mastiff; the muzzle is deep, the ears are pendulous, the fur is rather long and wiry, the eye is full and very expressive, and the form of the body and limbs indicates great strength. Their sense of smell is very acute, and aids them in the work of mercy to which the worthy monks of the convent of the Great St. Bernard have applied them. To the honour of those excellent men be it spoken, that while others have trained the dog to the combat, to the chase of the runaway slave, and to the pursuit of game, they have availed themselves of the power, intelligence, and courage of the dog, in rescuing the unhappy traveller from the horrors of death amidst the snows of the mountains.

One of these noble dogs was decorated with a medal in commemoration of his having saved the lives of twenty-two persons, who but for his sagacity must have perished. He was lost in 1816, in an attempt to convey a poor traveller to his anxious family. The man was a Piedmontese courier, who arrived at St. Bernard in a very stormy season, labouring to make his way to the little village of St. Pierre in the valley beneath the mountain, where his wife and children dwelt; it was in vain that the monks attempted to check his resolution to reach his family. They at last gave him two guides, each of whom was accompanied by a dog, of which one was the remarkable creature whose services had been so valuable to mankind. Descending from the convent they were in an instant overwhelmed by two avalanches, and the same common destruction awaited the family of the poor courier, who were toiling up the mountain to obtain some news of their expected friend; they all perished. A story is told of one of these dogs, who having found a child unhurt, whose mother had been destroyed by an avalanche, induced the boy to mount upon his back, and thus carried him to the gate of the convent: the subject (Fig 887) is represented in a French print.

The wolf-dog of the Abruzzi is pure white, somewhat more lightly formed than the Newfoundland dog, but strong and muscular. The hair is long and flowing; two beautiful specimens are in the gardens of the Zoological Society. (Fig. 887*.)

The Labrador and Newfoundland dogs are often confounded together. The Labrador dog exceeds in size the Newfoundland animal, and is often of extraordinary dimensions. A fine specimen measured some time since, gave us the following particulars:—Total length, including the tail, six feet three inches; height at the shoulder, two feet six inches; length of head from occiput to point of nose, eleven inches; circumference of chest, three feet one inch. In Labrador these powerful and intelligent dogs are used for drawing sledges loaded with wood, and are of great service to the settlers. (Fig. 862, *e*.)

The Newfoundland dog is of less stature, but more compactly built, and is muscular and sagacious. These animals are also used for drawing sledges and little carriages laden with wood, fish, and other commodities, and are very valuable in their native country. Both the Labrador and Newfoundland breeds are admirable water-dogs, and make excellent retrievers. Their fidelity and attachment to their masters are well known, and all are familiar with instances in which human beings about to perish in the water have owed their life to the courage and exertions of these devoted creatures.

Our next group contains the hounds, including the pointer. Several varieties of hounds now exist in our island, and of these the Beagle, the Harrier, and the Fox-hound are familiar to all our readers. No country equals England in the swiftness, spirit and endurance of its hounds, and in no country is so much attention paid to the different breeds, especially the harrier and fox-hound. The beagle (Fig. 888) was formerly a great favourite, but is now little used. It is of small stature, but of exquisite scent, and its tones, when heard in full cry, are musical. It has not, however, the strength or fleetness of the harrier, and still less so of the fox-hound, and hence it does not engage the attention of the sportsmen of the modern school, who, unlike Sir Roger de Coverley, are impetuous in the field, preferring a hard run to a tame and quiet pursuit. The beagle was only employed in hunting the hare, as is the harrier, but the fox-hound is trained both for the deer and the fox. The strength and powers of scent of the fox-hound are very great, and many astonishing instances of the energy and endurance of these animals are on record.

Formerly two noble varieties of the hound were common in England, which are now seldom seen. We allude to the old English hound and the blood-hound.

Of the old English hound, which is described by Whittaker, in his 'History of Manchester,' as the original breed of our island, we some years since saw a fine specimen in Lancashire. It was tall and robust, with a chest of extraordinary depth and breadth, with pendulous lips, and deeply set eyes; the ears were large and long, and hung very low; the nose was broad, and the nostrils large and moist. The voice was deep, full, and sonorous. The general colour was black, passing into tan or sandy red about the muzzle and along the inside of the limbs. Shakspere's description of the hounds of Theseus, in the 'Midsummer Night's Dream,' is true to the letter as referring to this breed, with which he was no doubt well acquainted:—

> "My hounds are bred out of the Spartan kind,
> So flew'd, so sanded; and their heads are hung
> With ears that sweep away the morning dew;
> Crook-knee'd and dew-lapped like Thessalian bulls;
> Slow in pursuit, but match'd in mouth like bells,
> Each under each."

Besides the old English or Southern hound, was the old English stag-hound, or Talbot (Fig. 862, *g*), a powerful dog, but of lighter form, and more fleet, than the former: from this breed has descended the still lighter and swifter fox-hound of the present day.

Among the hounds of the "olden time" was the Blood-hound, so celebrated for its exquisite scent and unwearied perseverance, qualities which were taken advantage of, by training it not only to the chase of game, but to the pursuit of man. A true blood-hound (and the pure blood is rare) stands about eight and twenty inches in height, muscular, compact, and strong; the forehead is broad, and the face narrow towards the muzzle; the nostrils are wide and well developed; the ears are large, pendulous, and broad at the base; the aspect is serene and sagacious; the tail is long, with an upward curve when in pursuit, at which time the hound opens with a voice deep and sonorous, that may be heard down the wind for a very long distance. (Figs. 888* and 862, *h*.)

The colour of the true breed is stated to be almost invariably a reddish tan, darkening gradually towards the upper parts till it becomes mixed with the black on the back; the lower parts, limbs, and tail being of a lighter shade, and the muzzle tawny: Pennant adds, "a black spot over each eye," but the blood-hounds in the possession of Thomas Astle, Esq. (and they were said to have been of the original blood) had not these marks. Some, but such instances were not common, had a little white about them, such as a star in the face, &c. The better opinion is, that the original stock was a mixture of the deep-mouthed Southern hound and the powerful old English stag-hound.

Our ancestors soon discovered the infallibility of the blood-hound in tracing any animal, living or dead, to its resting-place. To train it, the young dog, accompanied by a staunch old hound, was led to the spot whence a deer or other animal had been taken on for a mile or two; the hounds were then laid on and encouraged, and after hunting this "drag" successfully, were rewarded with a portion of the venison which composed it. The next step was to take the young dog with his seasoned tutor, to a spot whence a man whose shoes had been rubbed with the blood of a deer had started on a circuit of two or three miles: during his progress the man was instructed to renew the blood from time to time, to keep the scent well alive. His circuit was gradually enlarged at each succeeding lesson, and the young hound, thus entered and trained, became, at last, fully equal to hunt by itself, either for the purpose of woodcraft, war, or "following gear," as the pursuit after the property plundered in a border foray was termed.

Laid on the track of a marauder, it kept up a steady, persevering chase, and was not baffled without difficulty. Sir Walter Scott, in his graphic description of the "stark moss-trooper" Sir William of Deloraine, "good at need," gives, as a proof of his merit, that he

> "By wily turns and desperate bounds
> Had baffled Percy's best blood-hounds;"

and the same accomplished knight, his stern nature touched by sorrow at the sight of Sir Richard Musgrave slain, thus eulogizes his dead enemy:—

> "Yet rest thee God! for well I know
> I ne'er shall find a nobler foe
> In all the northern countries here,
> Whose word is snaffle, spur, and spear,
> Thou wert the best to follow gear
> 'Twas pleasure, as we look'd behind,
> To see how thou the chase couldst wind,
> Cheer the dark blood hound on his way,
> And with the bugle rouse the fray.
> I'd give the lands of Deloraine,
> Dark Musgrave were alive again"

Sir Walter Scott states that the breed of bloodhounds was kept up by the Buccleuch family on their border estates till within the eighteenth century In former ages these dogs, or, as the Scotch called them, "Sleuth-hounds," were kept in great numbers on the Borders; and fugitive kings as well as moss-troopers were obliged to study how to evade them Bruce was repeatedly tracked by these dogs, and on one occasion only escaped by wading for a considerable distance up a brook and climbing a tree which overhung the water. "A sure way of stopping the dog was to spill blood upon the track, which destroyed the discriminating fineness of the scent. A captive was sometimes sacrificed on such occasions. Henry the Minstrel tells a romantic story of Wallace, founded on this circumstance. The hero's little band had been joined by an Irishman named Fawdon, or Fadzean, a dark, savage, and suspicious character After a sharp skirmish at Black-Erne Side, Wallace was forced to retreat with only sixteen followers. The English pursued with a border blood hound. In the retreat Fawdon, tired, or affecting to be so, would go no farther, Wallace having in vain argued with him, in hasty anger struck off his head, and continued the retreat When the English came up, their hound stayed upon the dead body." (Notes to the 'Lay of the Last Minstrel.')

To the present group has generally been referred the Cuban blood-hound, as it is termed, a dog of Spanish descent, sagacious and savage, and which was employed by the Spaniards with atrocious barbarity in their conquest of America, and more recently (1795) in Jamaica against the Maroons, who had revolted, and were waging a bloody and successful war against the government forces, but which the very terror these dogs inspired at once happily brought to a close

These dogs, used in Cuba in the pursuit of murderers and felons, have a fine scent and great power: specimens exist in the Gardens of the Zool. Soc. (Figs. 889, 890, 891).

Their colour is tawny, with black about the muzzle; the ears are comparatively small, the muzzle is shorter and more pointed than in the ordinary hound, and they are shorter on the limbs, in some points they approach the mastiff or ban-dog, especially in the form of the head, which approaches that of the bull-dog indeed, by many, and with reason, they are regarded more as a variety of the mastiff than the hound, and for ourselves, we hesitate not to regard them as such They make excellent watch-dogs, and attack both the bull and the bear with determined resolution. Their height at the shoulder is about two feet.

We have hitherto said nothing of the pointer (Fig. 862, *c*). The present pointer is derived from a heavy dog, possessing the sense of smell in the highest perfection, known as the old Spanish pointer, and decidedly related to the hound, this dog is now seldom seen; like the talbot, the source, as we presume, of the light, active, but vigorous fox-hound, the old Spanish pointer has merged into the intelligent, vigorous dog so much prized by the sportsman for its excellent qualifications. In some breeds of pointers there is, we believe, a cross of the fox-hound, which improves their strength and energy.

We now enter upon a group of dogs distinguished by the shortness of the muzzle and the breadth of the head, this latter character resulting not from a corresponding development of the brain, but from the magnitude of the temporal muscles, which are attached to a bony ridge passing down the median line of the skull. The expression of the eyes is lowering and ferocious; the jaws are very strong, the lips pendulous; the general form is thick-set and robust; the limbs are muscular.

This group comprehends the Bull-dog, the Mastiff, and their allies. In sagacity and intelligence the dogs of the present section are not to be compared to the Newfoundland dog, the spaniel, or the shepherd's dog; they surpass all, however, in determined courage and prowess in combat. In early times the English mastiff was celebrated for its strength and resolution, characteristics which did not fail to attract the attention of the Romans when this island formed a part of their widely-spread empire. To a people in whom a partiality for scenes of bloodshed and slaughter, and for the sanguinary games of the amphitheatre, was a ruling passion, dogs so fitted to gratify their taste were peculiarly acceptable, and accordingly we find that they were bred and reared by officers specially appointed, who selected such as were distinguished for combative qualities, and sent them to Rome for the service of the amphitheatres, where they were matched in fight with various beasts of prey. Dr. Caius, a naturalist of the time of Elizabeth, states that three were reckoned a match for a bear, and four for a lion.

Stow, in his 'Annals,' gives us the account of an engagement between three mastiffs and a lion, which took place in the presence of James I. The battle reminds us of a recent occurrence, excepting that the dogs which fought with Nero and Wallace were not mastiffs, but half bred bull-dogs "One of the dogs,' says Stow, "being put into the den, was soon disabled by the lion, which took it by the head and neck, and dragged it about. Another dog was then let loose, and served in the same manner; but the third, being put in, immediately seized the lion by the lip, and held him for a considerable time, till, being severely torn by his claws, the dog was obliged to quit its hold, and the lion, greatly exhausted in the conflict, refused to renew the engagement, but, taking a sudden leap over the dogs, fled into the interior part of his den Two of the dogs soon died of their wounds. the last survived' The mastiff is by far the most sagacious of the present section, and, of all other dogs, makes the best guardian of property It is attached to its master, but towards strangers is fierce and suspicious Its bark is deep and sonorous

Though the mastiff has by no means the keen sense of smell which the hound possesses, it seems to be (at least such is our opinion, and that not hastily formed) either an offset from that branch, or a cognate branch from the same root. The mastiff, however, has a finer scent than persons are generally aware of, and its hearing is very acute. A dog of this breed, chained to his kennel, and never suffered to wander about the premises nor treated as a friend and companion, affords but a poor example of what the animal really is Confinement spoils its temper, and cramps the development of its noble qualities. (See Fig 863, *a*, and Fig 892)

We have said that the mastiff is allied to the hound the Cuban mastiff, to which we have already alluded, is, indeed, often termed a bloodhound. The pendulous ear, not so large in the mastiff as in the hound, the thick hanging lips, the broad moist nose, the brindled markings, and the general figure, attest the affinity The mastiff is larger and stronger than the hound, and useless for the chase, this latter circumstance, however, is no proof of diversity of origin It must be remembered that particular instincts and qualities are acquired, and that the excellences of the hound are the result of long-continued and judicious culture We do not say that the mastiff can be converted into the hound, but merely that two branches from the same root may be so cultured as to assume, to a given point, diverse characteristics

The huge Thibet watch dog (Fig 893) belongs to the present section. This dog (*Canis familiaris*, var. *Molossus Thibetanus*) is kept by the natives of the Thibet range of hills as a guardian of their flocks and their villages It is very fierce, and its bark is loud and terrific. The colour is generally black.

The Ban-dog (Fig 863. *c*) is a term given to any of the fierce animals of the present section, which are in ordinary cases kept chained or secured in kennels. Bewick, however, applies it to a dog of which he gives an excellent figure, and which he states to differ from the mastiff in being lighter, more active and vigilant, but not so powerful or so large; its muzzle, besides, is not so heavy, and it possesses in some degree the scent of the hound. Its hair is described as being rather rough, and generally of a yellowish grey streaked with shades of black or brown It is ferocious and full of energy. Bewick says that this dog is seldom to be seen at the present day; we have, however, had occasion to notice varieties of the mastiff so closely agreeing with Bewick's figure and description, as to convince us that he took both of them from nature.

Of all the dogs of this section none surpass in obstinacy or ferocity the bull-dog. This animal is smaller than the mastiff, but more compactly formed; the chest is broad and deep; the loins narrow; the tail slender and arched up; the limbs short and robust; the head is broad and thick; the muzzle short and deep; the jaws strong, the lower jaw often advancing, so that the inferior incisor teeth overshoot the upper; the ears are short and semi-erect, the nostrils distended, the eyes scowling, and the whole expression calculated to inspire terror. This dog is distinguished by tenacity of tooth and indomitable resolution. In all its habits and propensities it is essentially gladiatorial. it is a fighting dog, and nothing else, its intelligence is very limited; and though dogs of this breed are attached to their masters, they exhibit in the demonstration of their feelings, unless when incited to combat, a perfect contrast to the Newfoundland dog or spaniel. These latter delight to accompany their master in his walks, and scour the fields and lanes in the exuberance of delight, the bull-dog skulks at its master's heels, and regards with a suspicious glance everything and everybody that passes by, nor, indeed, is it safe to approach the animal, for it often attacks without the slightest provocation. A cross between the bull-dog and the terrier is celebrated for spirit and determination.

It has been usual to consider the pug-dog as a degenerate variety of the bull-dog, but we doubt the correctness of this theory. It has indeed somewhat the aspect of the bull dog, on a miniature scale; but the similarity is more in superficial appearance than reality. The pug is a little round-headed short-nosed dog, with a preternatural abbreviation of the muzzle, and with a tightly twisted tail Like the Gillaroo trout, it is a specimen of hereditary malformation Not so the bull-dog, in which the bones of the skull and the temporal muscles are finely developed, and in which the muzzle and head are in perfect harmony.

The pug-dog is snarling and ill-tempered, but cowardly, and by no means remarkable for intelligence Formerly it was in great esteem as a pet, but is now little valued, and not often kept.

In taking a review of the various breeds of the domestic dog, we cannot fail to observe that they are endowed respectively with qualifications or habits certainly not innate, but the result of education, at least originally, which education, continued through a series of generations, has produced permanent effects For example, no dog in a state of nature would point with his nose at a partridge, and then stand like a statue, motionless, for the dog would gain nothing by such a proceeding Man, however, has availed himself of the docility and delicacy of scent peculiar to a certain breed, and has taught the dog his lesson, and the lesson thus learned has become second nature. A young pointer takes to its work as if by intuition, and scarcely requires discipline. Hence, therefore, must we conclude that education not only effects impressions on the sensorium, but transmissible impressions, whence arise the predispositions of certain races Education in fact modifies organization not that it makes a dog otherwise than a dog, but it supersedes, to a certain point, instinct, or makes acquired propensities instinctive, hereditary, and therefore characteristics of the race. The effect of this change of nature is not to render the dog more independent, nor to give it any advantage over its fellows, but to rivet more firmly the links of subjection to man

It is not to the pointer alone that these observations apply, all our domestic dogs have their own acquired propensities, which, becoming second nature, make them, in one way or another, valuable servants No one, we presume, will suppose that the instinctive propensities implanted by nature in the shepherd's dog make it not a destroyer, but a preserver of sheep On the contrary, this dog, like every other, is carnivorous, and nature intends it to destroy and devour But education has supplanted instinct, to a certain point, and implanted a disposition which has become an hereditary characteristic, and hence a shepherd's dog of the true breed takes to its duties naturally But a shepherd's dog could not, delicate as its sense of smell is, be brought to take the place of the pointer in the field, even though it were subjected to training from the earliest age; nor, on the other hand, could a pointer be substituted with equal advantage in the place of a shepherd's dog as the assistant of the drover Each is civilized, but in a different style, and education has impressed upon each a different bent of mind, a different class of propensities

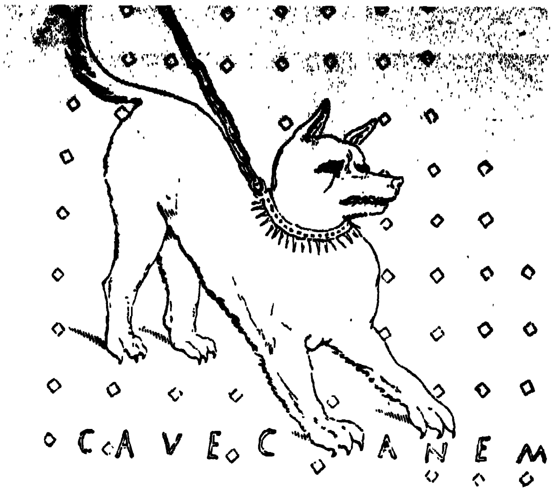
The following is the arrangement of the groups into which the breeds of the domestic dog seem to us to resolve themselves:—

1. Dingo—semi-domestic?
2 Esquimaux dog?
3. Hare Indian's dog?

To what groups these respectively belong is not very clear; probably to the first or second of the following groups:—

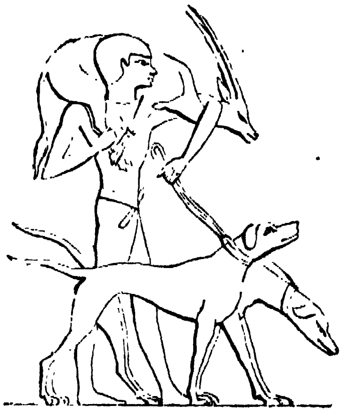
Ears sharp, erect, or sub-erect; nose pointed; hair long	**Shepherd's dog. Siberian. Pomeranian. Icelandish, &c.**

878.—Highland Shepherd and Dog.

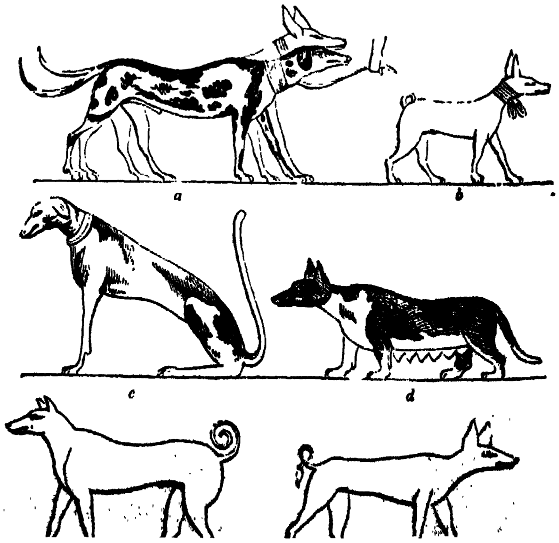


894.—Roman House-dog.

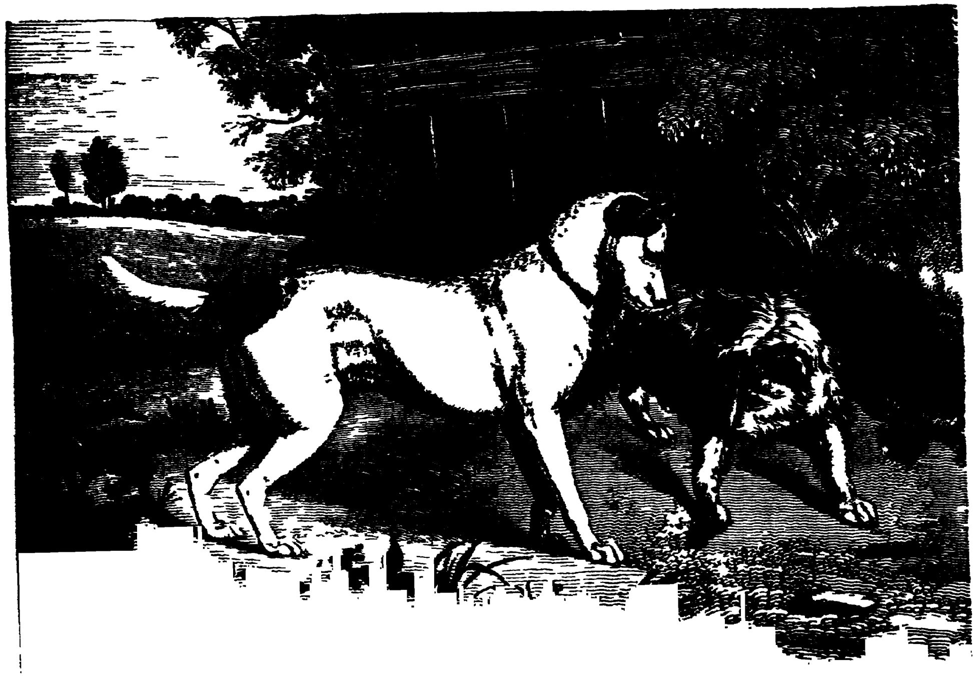
883.—Street Dogs of the East.

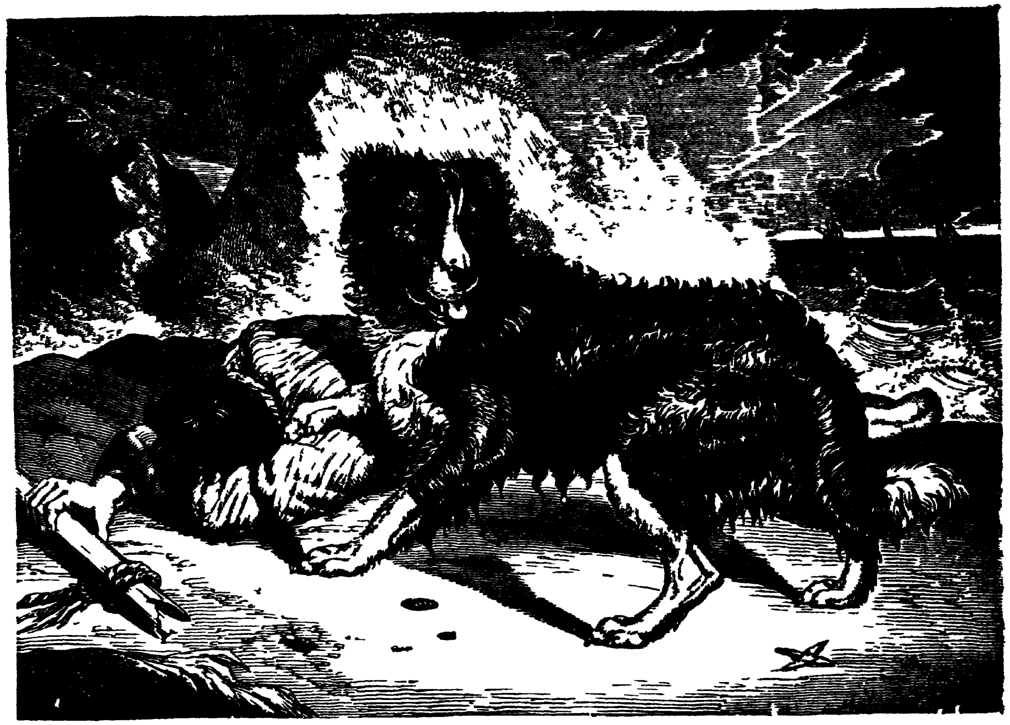


886.—From an Egyptian Painting



687* —Italian Wolf Dogs





679.—Newfoundland Dog

Muzzle less acute; ears sub-erect; hair short or wiry.	Terrier, rough and smooth. Turnspit. Barbary dog. Lurcher, &c.
Ears moderate, narrow, generally pendulous; muzzle produced.	Great Danish dog. Irish wolf-dog. Scotch Grey-hound, or Deer-hound. English ditto. Italian ditto. Persian ditto. Albanian dog, &c.
Ears moderately large, pendent; muzzle moderate; hair long.	Spaniel. Water-Spaniel. Rough water dog. Setter, &c.
Ears moderately large and pendent; muzzle deep and strong; hair long or wiry.	Italian wolf-dog. Newfoundland dog. Labrador dog. Alpine dog, &c.
Ears large and pendent; muzzle long and deep, nose large; hair close	Pointer. Beagle. Harrier. Fox-hound. Old English hound. Blood-hound. African hound, &c.
Ears moderate, pendent; muzzle short and thick; hair short.	Cuban mastiff. Mastiff. Ban-dog. Bull-dog. Corsican bull-dog, &c. Pug dog?

This and every other attempt to arrange the various breeds of dogs under different heads will necessarily be defective, from our want of information respecting the races of antiquity; an accurate knowledge of which would throw considerable light on our modern varieties. We know indeed that the Greeks and Romans had valuable dogs for hunting various wild animals, and paid great attention to them, but we know little beyond. They had watch dogs, hounds, a greyhound breed, and probably a breed of spaniels, the Canis Tuscus, also described as Proles de sanguine Ibero. Fig. 894 is a copy of a dog represented on a mosaic pavement at Pompeii, fastened by a chain, with the caution "Cave canem" ("Beware the dog") written at its feet: the small sharp ears and elongated muzzle give it a wild aspect: it appears to be a strongly-made, vigorous animal; but if it represent the Dogue de forte race of the Romans, we cannot wonder at their sending to Britain for our old indigenous mastiff.

In Egypt the dog was a favourite, and carefully bred, and, as the paintings of that people prove, there were several breeds. It would appear, indeed, that some kinds were regarded with religious veneration, and embalmed after death. Mummies of them are still found. We have seen the remains of a red short-haired dog thus preserved. Figs. 895 and 896 are outlines of dogs from Egyptian paintings. Fig. 895, *a*, two hounds, or a hound and greyhound in couples. The style of colouring on the foremost dog, regarded as a hound, reminds us of the hounds of modern days; *b* is evidently a pet domestic dog, with sharp ears and a curled tail; *c*, a hound; *d*, a short-legged dog, not unlike our turnspit, with sharp ears, and which appears to have been a favourite; *e* is probably a watch-dog of the "forte race," excepting that its tail is more curled, it has a striking resemblance to the Roman house-dog (Fig. 894); *f* is a hunting-dog, as it would seem, being found frequently in attendance on chasseurs. Fig. 896 represents a huntsman bringing home an antelope with a brace of coupled hounds. The modern greyhound of Arabia (Fig. 885) so closely resembles the delineations of the ancient greyhound, that we cannot doubt their affinity. The Egyptians in the chase used the bow and spear, and intercepted the game as it fled before the hounds, discharging their arrows whenever it came within range. When a fierce antelope, as the Leucoryx, was brought to bay, the hunter gallantly used his spear, as the boar-hunter of the middle ages in Europe. On the level plains of Egypt the chasseur often followed in his chariot, urging his horses to the full speed, and endeavouring to meet the game, or place himself in the direction the dogs were forcing it to take, with his bow and arrows ready. It was perhaps the partiality evinced by the Egyptians to the dog, that led the Israelites to regard it with abhorrence, as an unclean animal; in which feeling they have been followed by the Mohammedans. Be this as it may, Palestine "is the country in which this animal has the longest been refused that entire domestication with man which he has enjoyed in most other lands; in other words, the treatment of the dog has almost always in Palestine been such as it has only in other countries been subject to since the propagation of the Moslem faith. And since the ideas concerning dogs have been much the same with the ancient Jews and modern Moslems, there is no doubt that the existing practices of the latter illustrate the ancient practices of the former. Among both we trace the despised, but not maltreated dog of the streets, and among both we discover that, with every predisposition to do without them, certain breeds of dogs have forced their services upon man, from the indispensable nature of their help in hunting and in guarding the flocks."

These street dogs (Figs. 883 and 884), called Pariah dogs in India, have excited the attention of all travellers in India, Turkey, and the whole of the Levant. They roam the streets of towns, cities, and villages, owned by no one, but, for their services in clearing away carrion and offal, universally tolerated. We find allusions to them in the earliest records of antiquity. Homer pictures them in conjunction with vultures, as feeding upon the slain:—

> "Whose limbs unburied on the naked shore
> Devouring dogs and hungry vultures tore."
> Pope's *Transl.*

In the Scriptures there are abundant allusions, as for example, Exodus xxii. 31; 1 Kings xxi. 19 and 23; 2 Kings ix. 35, and elsewhere. The passages of most force, "In the place where the dogs licked the blood of Naboth, shall dogs lick thy blood, even thine;" and, "The dogs shall eat Jezebel by the wall of Jezreel," bring to mind the picture of a scene painted in modern days by a poet, who had travelled in Greece and Turkey, and well knew the habits of the masterless dogs that "wander up and down for meat, and grudge if they be not satisfied."

> "He saw the lean dogs beneath the wall
> Hold o'er the dead their carnival,
> Gorging and growling o'er carcass and limb,
> They were too busy to bark at him!
> From a Tartar's skull they had stripp'd the flesh,
> As ye peel the fig when the fruit is fresh;
> And their white tusks crunch'd o'er the whiter skull,
> As it slipt through their jaws when their edge grew dull,
> As they lazily mumbled the bones of the dead,
> As they scarce could rise from the spot where they fed,
> So well had they broken a lingering fast
> With those who had fallen for that night's repast."
> Byron's *Siege of Corinth.*

Pariah dogs herd together in troops, and keep to their respective districts; they display all the qualities and propensities of their race, and if they are fierce and ravenous, it is because they are left to their own resources, since to become at once domestic they require only to be owned and noticed. Colonel Sykes, speaking of the Pariah dog of Dukhun, observes that it is there very numerous, and not individual property, but breeds in the towns and villages unmolested. He remarks that the Turnspit dog, long backed, with short crooked legs, is frequently found among the Pariahs. There is also a petted minute variety of the Pariah dog, usually of a white colour, with long silky hair, corresponding to a common lap dog of Europe: this is taught to carry flambeaux and lanterns. The last variety noticed is the dog with hair so short as to appear naked, like the Barbary or Egyptian dog. It is known to Europeans by the name of the Polygar dog. Of the *Domesticated* dogs, Colonel Sykes states, that the first in size and strength is the Brinjaree dog, which somewhat resembles the Persian greyhound, but is much more powerful.

It may here be expected that we should enter into some details illustrating the intelligence and fidelity of this animal, which seems expressly made for man, which instinctively clings to him, and which watches his every look and gesture. But who from his own experience cannot bear testimony to the good qualities of the dog! It has been somewhere said, and with truth, that man is the god of the dog, for to man he looks up with reverence and affection, and the praise of his master is his richest reward. Is this instinctive attachment of the dog to man an acquired feeling, or is it an original impulse implanted in its nature, by the All-wise Creator, for man's benefit, so that in the primitive condition of society he might have a friend and assistant, all-important in the chase, and in the extirpation of wild beasts, which ere he can settle in the land and found a colony, he must drive to a distance or destroy?

We turn to our pictorial specimens, and one (Fig. 897) appeals strongly to our feelings; it represents a fine Newfoundland dog, dripping with the briny water, and in whose face is depicted the utmost anxiety, as if watching eagerly for assistance, while one foot rests upon the shoulder of a wrecked seaman which he has succeeded in dragging to shore. The picture tells its own story.

The following anecdote respecting the Newfoundland dog is very interesting:—

"A native of Germany, fond of travelling, was pursuing his course through Holland, accompanied by a large Newfoundland dog. Walking one evening on a high bank, which formed one side of a dike, or canal, so common in that country, his foot slipped, and he was precipitated into the water, and, being unable to swim, he soon became senseless. When he recovered his recollection, he found himself in a cottage on the opposite side of the dike to that from which he had fallen, surrounded by peasants, who had been using the means so generally practised in that country for restoring animation. The account given by the peasants was, that one of them returning home from his labour observed, at a considerable distance, a large dog in the water swimming, and dragging, and sometimes pushing, something which he seemed to have great difficulty in supporting, but which he at length succeeded in getting into a small creek on the opposite side to that on which the men were.

"When the animal had pulled what he had hitherto supported as far out of the water as he was able, the peasant discovered that it was the body of a man. The dog, having shaken himself, began industriously to lick the hands and face of his master, while the rustic hastened across; and, having obtained assistance, the body was conveyed to a neighbouring house, where the usual means of resuscitation soon restored him to sense and recollection. Two very considerable bruises, with the marks of teeth, appeared, one on his shoulder, the other on the nape of the neck, whence it was presumed that the faithful animal first seized his master by the shoulder, and swam with him in this manner for some time, but that his sagacity had prompted him to let go his hold, and shift his grasp to the neck, by which he had been enabled to support the head out of the water. It was in the latter position that the peasant observed the dog making his way along the dike, which it appeared he had done for a distance of nearly a quarter of a mile. It is therefore probable that this gentleman owed his life as much to the sagacity as to the fidelity of his dog."

Wordsworth, in a beautiful little poem, has given an affecting instance of the fidelity of a dog, which we need make no apology for quoting:—

> "A barking sound the shepherd hears,
> A cry as of a dog or fox;
> He halts, and searches with his eyes
> Among the scatter'd rocks:
> And now at distance can discern
> A stirring in a brake of fern;
> From which immediately leaps out
> A dog, and yelping runs about.
>
> The dog is not of mountain breed,
> Its motions too are wild and shy;
> With something, as the shepherd thinks,
> Unusual in its cry:
> Nor is there any one in sight
> All round, in hollow or on height;
> Nor shout nor whistle strikes his ear;
> What is the creature doing here?
>
> It was a cove, a huge recess,
> That keeps till June December's snow;
> A lofty precipice in front,
> A silent tarn* below!
> Far in the bosom of Helvellyn,
> Remote from public road or dwelling,
> Pathway, or cultivated land;
> From trace of human foot or hand.
>
> There sometimes does a leaping fish
> Send through the tarn a lonely cheer;
> The crags repeat the raven's croak,
> In symphony austere;
> Thither the rainbow comes, the cloud;
> And mists that spread the flying shroud;
> And sunbeams; and the sounding blast,
> That, if it could, would hurry past;
> But that enormous barrier binds it fast.
>
> Not knowing what to think, awhile
> The shepherd stood; then makes his way
> Towards the dog, o'er rocks and stones,
> As quickly as he may;
> Nor far had gone before he found
> A human skeleton on the ground;
> Sad sight! the shepherd with a sigh
> Looks round to learn the history.
>
> From those abrupt and perilous rocks
> The man had fallen, that place of fear!
> At length upon the shepherd's mind
> It breaks, and all is clear:
> He instantly recall'd the name,
> And who he was, and whence he came;
> Remember'd, too, the very day
> On which the traveller pass'd this way.
>
> But hear a wonder now, for sake
> Of which this mournful tale I tell!
> A lasting monument of words
> This wonder merits well.
> The dog, which still was hovering nigh,
> Repeating the same timid cry,
> This dog had been through three months' space
> A dweller in that savage place.
>
> Yes, proof was plain that since the day
> On which the traveller thus had died
> The dog had watch'd about the spot,
> Or by his master's side:
> How nourish'd here through such long time
> *He* knows, who gave that love sublime,
> And gave that strength of feeling, great
> Above all human estimate."

It is about thirty-seven years ago that the fatal accident happened which furnished a subject for the above beautiful poem by Mr. Wordsworth. The circumstances were recently detailed to a tourist by one of the guides who conducts visitors to the summits of Skiddaw and Helvellyn. The unfortunate man who perished amidst these solitudes was a resident of Manchester, who was periodically in the habit of visiting the lakes, and who, confiding in his knowledge of the country, had ventured to cross one of the passes of Helvellyn, late in a summer afternoon, in company only with his faithful dog. Darkness, it is supposed, came on before his expectation; he wandered from the track; and fell over the rocks into one of those deep recesses where human foot never treads. The dog was found by the side of his master's body, after many weeks' fruitless search. The man who told the story had never heard of the poem, but the sentiment of natural piety with which it concludes was on his lips. "God knows," he said, "how the poor beast was supported so long."

---

* Tarn is a small lake, or mere, mostly in high mountains.

Fig. 898 illustrates the singular attachment that occasionally takes place between the dog and other animals. The wood-cut represents a spaniel bitch in company with a young lion, belonging to Atkins's menagerie, in 1828. The lion was ill, and the spaniel nourished it and tended it with the utmost solicitude.

We have alluded to the great similarity, notwithstanding their mutual hostility, which exists between the Esquimaux dog and the wolf, and we have introduced a representation of the former animal, in order the better to compare it with the wolf, and to show how closely it resembles a mixed breed between the dog and the wolf, of which two individuals were exhibited in 1828 in Mr Wombwell's menagerie. Fig 899 is a representation of several Esquimaux dogs harnessed by their masters to a sledge, Fig 900 represents the two specimens of the mixed breed, Figs 901, 902, 903, the Wolf. We have already denied the correctness of the inference, that because the wolf and the jackal respectively breed with the dog, they are therefore, as Hunter affirmed, all of one species: no one, we think will now regard the wolf and the jackal as identical; nor is there any more ground for believing that the dog is either the one or the other, than for assuming that the wolf and the jackal are one.

Figs 904 and 905 are the skull of the European wolf, in two views: it differs in various minor details from the skull of the Canada wolf, of which Figs 906 and 907 are two similar views.

Figs 908 and 909 represent the skull of the Jackal, in two views, it differs from those both of the European and American wolf. These skulls may be compared with those of the various breeds of dogs previously given. Fig 910 is a spirited delineation of the head of the Wolf, for comparison with that of the nearest of the dogs. We shall now pass from a consideration of the dog, to its proximate ally.

901, 902, 903, 911, 919. The Wolf.

(*Canis Lupus*). Λυκος, Aristotle, le Loup, French, il Lupo, Italian. A robust but gaunt frame, a skulking or irresolute gait, ferocity mingled with cunning and cowardice, and a wild yet sinister expression of the physiognomy, characterize this beast of prey. Spread throughout Europe and various parts of Asia, it is more particularly in mountain and forest districts that the wolf prevails where the population is scanty, and collected into small towns or villages, with a wide country around, destitute of human dwellings. In the Pyrenees, the Carpathian mountains, in Poland, Hungary, some parts of Austria, France, Italy, and Spain, in Norway, Sweden, and Russia, the wolf is yet common, as well as in western Asia, and the border territories included in Europe. Formerly this animal was abundant in the British Islands, and the plague and terror of the country. Verstegan, in his Restitution of decayed Intelligence in Antiquities, concerning the most noble and renowned English nation,' 1605, observes that January was called Wolf-monat by the Anglo-Saxons, "because people were wont in that month to be more in danger to be devoured of wolves than in any season else of the yeare, for that through the extremity of cold and snow those ravenous creatures could not find other beasts sufficient to feed upon." The universal fear which the wolf, where numerous, would naturally inspire, was formerly heightened by superstition, and fiends or malignant beings were imagined as having power to assume the form and power of this dreaded animal. Lycanthropos of the Greeks, the Were-wolf of the Anglo-Saxons, and the Loup-garou of the French had reference to some such preternatural monster, whose name was associated with all that is horrible and mysterious. Conspicuous then, and dreaded for its power and ferocity, we can scarcely wonder that the wolf should have had its name assumed, or given to men of distinction, by our barbarous but warlike forefathers, among whom such appellations as Ethelwolf, Eadwolf, Berthwolf, and many more, were common.

It must not be supposed, however, that our Saxon ancestors tamely suffered the wolf to ravage the country. The attempt at extirpating this animal commenced in the tenth century under the reign of Edgar, and appears to have succeeded in the thirteenth century, during the reign of Edward I, as no historical mention is made of any royal edict, subsequently to that period, to promote their destruction. The last record of their existence in any formidable numbers was in 1281. It is said by Mr. Topham, in his notes to Somerville's 'Chace,' that it was in the wolds of Yorkshire where a price was last set upon a wolf's head. In Scotland and Ireland the wolf remained for a considerable period longer. In 1577, according to Hollinshed, these animals were destructive to the flocks in Scotland, and in Ireland they were exterminated only at the beginning of the last century.

In almost every department of France infested by the wolf there is a society called Société de Louveterie, the object of which is to keep that animal down, and premiums, varying in the amount according to the sex and age of the animals killed, are likewise paid. The means hitherto employed, however, have been inadequate to effect the purpose.

In Poland wolves are numerous and formidable, and they increased especially in the years from 1807 to 1815, in the province of Posen, after its separation from Prussia. In 1814 three grown persons and sixteen children were devoured by them in the small circle of Wongrowitz alone. When Prussia regained the province of Posen in 1815, no time was lost by the government in getting rid of so great a public nuisance, and in that province within five years, from 1815 to 1819 inclusive 4618 dollars were paid by the government in rewards for killing wolves. Latterly wolves have again increased in that province, for the use of fire-arms having been in a great measure prohibited in Poland after the Revolution these animals are rapidly multiplying there, and invade the neighbouring territories.

In the parish of Biala, district of Rawa, during the month of August, 1837, four girls were torn to pieces not far from their own houses. What must these animals be in winter, when even in summer they are thus daring?

Mr Lloyd in his 'Field Sports in the North of Europe' relates many narratives respecting these animals, it would appear that they are less dangerous to man than might be expected though they sometimes especially when combined in troops, attack travellers with great audacity. A gentleman attached to the embassy of St Petersburgh says Mr Lloyd related to me the following circumstance. 'It happened at no great distance from St Petersburgh, and only two years previously, a peasant when one day in his sledge was pursued by eleven of these ferocious animals. At this time he was only about two miles from home towards which he urged his horse at the very top of his speed. At the entrance of his residence was a gate, which happened to be closed at the time, but the horse dashed this open and thus himself and his master found refuge in the court yard. They were followed, however by nine out of the eleven wolves, but very fortunately at the very instant these had entered the enclosure, the gate swung back on its hinges and thus they were caught as in a trap. From being the most ferocious of animals, the nature of these beasts, now that they found escape impossible, became completely changed: so far, indeed from offering molestation to any one, they slunk into holes and corners, and allowed themselves to be slaughtered almost without making resistance. In the government of Livonia in Russia a district of about two hundred and fifty miles long and one hundred and fifty broad, the following animals were, according to official reports, destroyed by wolves in 1822: horses, 1841, fowls, 1243, cattle, 1807, calves, 733, sheep 15182, lambs, 726, goats 2545, kids 183, swine 4190, young pigs 312, dogs, 703, geese 673.

Desmarest says that the wolf is solitary and nocturnal, but that in winter it unites in troops which attack horses and men. The sense of smell is very acute but its speed is not very great, and it wearies out its victim by dint of untiring perseverance. When in full chase of its prey, it gallops along, pertinaciously following the track of the fugitive. The description of a troop of wolves in pursuit is admirably described by Lord Byron in his poem of 'Mazeppa':—

> 'We rustled through the leaves like wind,
> Left shrubs and trees and wolves behind;
> By night I heard them on the track,
> Their troop came hard upon our back,
> With their long gallop, which can tire
> The hound's deep hate and hunter's fire,
> Where'er we flew they followed on,
> Nor left us with the morning sun;
> Behind I saw them scarce a rood,
> At daybreak winding through the wood,
> And through the night had heard their feet
> Their stealing, rustling step repeat.'

From the numerous allusions to the wolf in the Scriptures, it is evident that it must have been well known formerly in Syria—and indeed also in Egypt, for we find it figured on ancient sculptures, together with the hyæna and greyhound. (Fig 912.) At present, however, this animal is seldom met with in Syria, although it still exists in that region, but keeps itself concealed.

So habitually cautious and suspicious is the wolf, that it is difficult to take it in traps, and for the same reason anything like the appearance of artifice deters it from an attack. (Fig. 913.) It has been supposed the wolf never carries his tail elevated, but this is not altogether correct; we have often watched the wolves in the Zoological Gardens gallop round the enclosure with the tail raised up as it is when the animals are in chase of prey; and also, as Dr Richardson states from observation, when they gambol with each other.

When pursued the wolf rushes along, with his muzzle almost to the ground, his eyes like glowing fire, the hair of his neck and shoulders erect, and his tail lowered and drawn close, when out of danger, he slackens his pace, raises his head, sniffs about, and whisks his tail around, as if exulting in his escape, but if brought to bay by hounds, he defends himself to the last, and often kills and maims some of his antagonists before he falls overpowered by numbers. (Fig. 914.) The Kirghese Tartars employ a large hawk in the chase, which fastens upon the animal's head, and tears its eyes. (Fig 902.)

Fierce as the wolf is, like the hyæna it can be tamed and even domesticated, but they require to be taken very young. M F Cuvier gives a very interesting account of a tame wolf, which showed all the affection that the most gentle dog could evince towards its master. When full grown, he was presented by his owner to the menagerie at Paris. For many weeks he was quite disconsolate at the separation from his master, who had been obliged to travel, he would scarcely take any food, and was indifferent to his keepers. At length he became attached to those about him, and he seemed to have forgotten his old affections. His master returned after an absence of eighteen months, the wolf heard his voice amidst the crowd in the gardens of the menagerie, and, being set at liberty, displayed the most violent joy. Again was he separated from his friend, and again was his grief as extreme as on the first occasion. After three years absence, his master once more returned. It was evening, and the wolf's den was shut up from any external observations, yet the instant the man's voice was heard, the faithful animal set up the most anxious cries, and the door of his cage being open, he rushed towards his friend, leaped upon his shoulders, licked his face and threatened to bite his keepers when they attempted to separate them. When the man left him, he fell sick, and refused all food, and from the time of his recovery, which was long very doubtful, it was always dangerous for a stranger to approach him. He appeared as if he scorned any new friendships.

Other instances of domestication are on record, and indeed, from our own personal experience, we hesitate not to state that the wolf may be completely reclaimed, more so than the Australian dingo.

The power of the wolf, especially in the muscles of the head, neck, and shoulders, is immense; and his bite is terribly severe, generally cutting out the flesh with a snap. Among themselves they fight often with great desperation, the combat ending with the death of the weaker. It is said that wolves wounded by the gunshot of hunters or travellers are torn in pieces and devoured by their fellows.

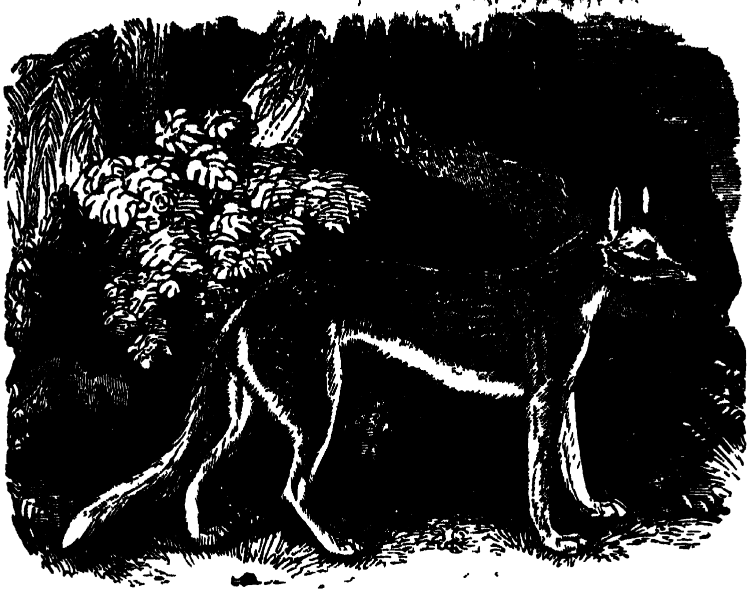
The average height of the wolf at the shoulders is about two feet six inches, the female rears her young in some cave or gloomy recess, and produces from five to nine young at a birth. These are born with the eyes closed, as in the dog. In the defence of her offspring the female is furious, and greatly to be dreaded. The voice of the wolf is a prolonged howl, resounding dismally through the stilly darkness of the night.

On the southern side of the Pyrenees there exists a variety perhaps of the wolf, termed, from its colour the Black Wolf (Canis Lycaon, Linn.), the Loup noir of Buffon. These animals are asserted to be more ferocious than the ordinary grey wolf, but perhaps without any foundation.

The common wolf of North America differs in some respects from its European relative, and is perhaps a distinct species. It wants the gaunt appearance, the comparatively long jaw and tapering nose, the high ears, long legs, slender loins, and narrow feet of the European wolf. Its frame also is more compact, the fur finer and thicker, the muzzle more obtuse, the head larger and rounder, and the forehead broader and more arched: the limbs are shorter, and the tail more fox-like and bushy.

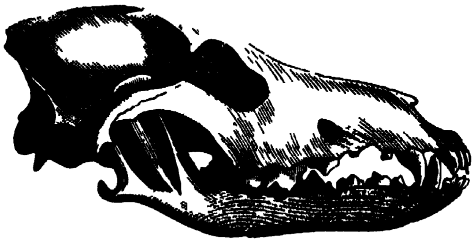
Dr Richardson, in his Fauna Boreali Americana, enumerates several varieties of this North American wolf, depending on colour, viz the grey, the white, the pied, the dusky or clouded, and the black. Black wolves abound on the Missouri, and, according to the Indians, black and grey wolves occur in the same litter. The dusky or clouded wolf was regarded by Say as a distinct species, and named by him Canis nubilus. (Fig. 915.)

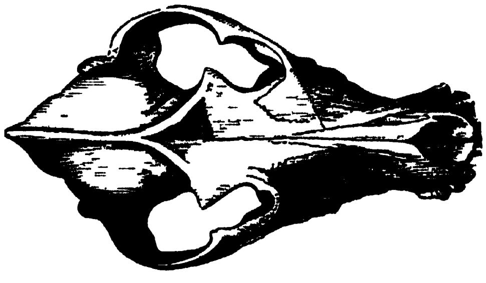
The American Wolf agrees in its general habits with the wolf of our Continent, though it appears to be less formidable as far as man is concerned. Indeed Captain Lyons, in his observations on the wolves



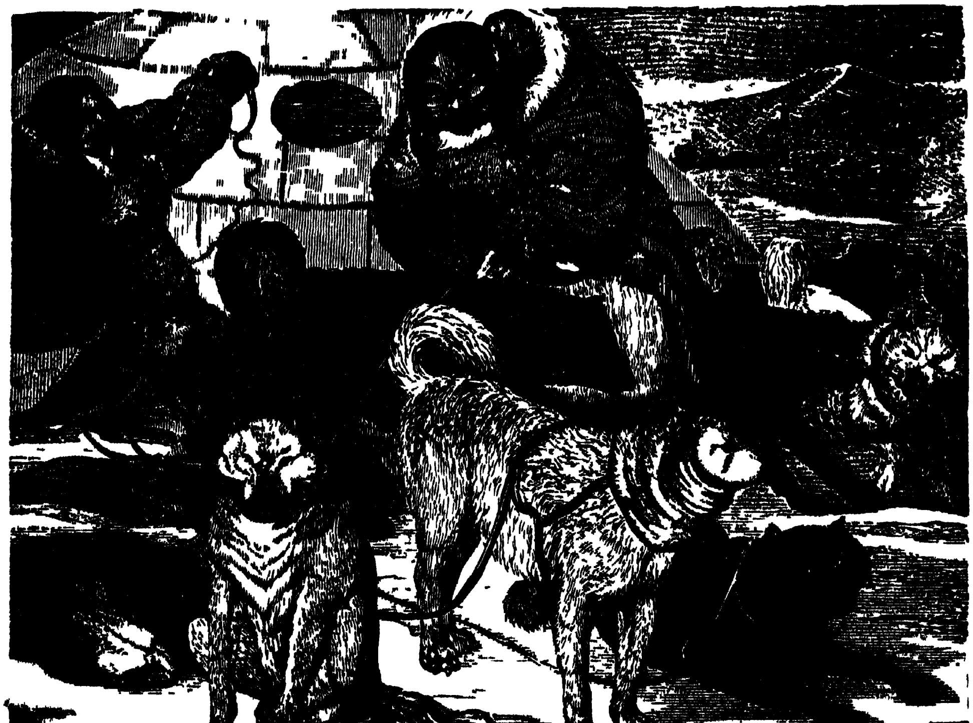
901.—Syrian Wolf

911.—Wolf in Trap

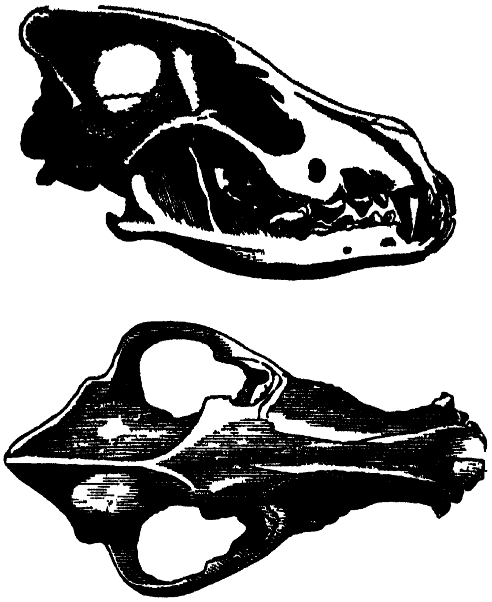




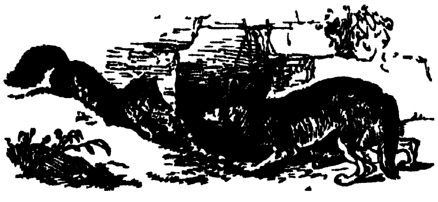
907.—Skull of Canadian Wolf



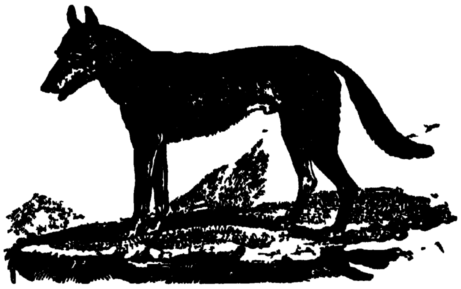
89 .—Esquimaux Dogs harnessed to a Sledge.



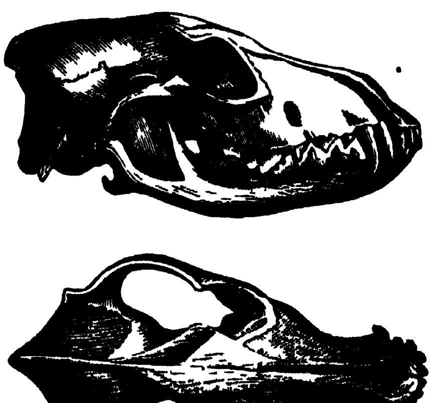
9 . Skull of European Wolf



911.—Wolf and Fox

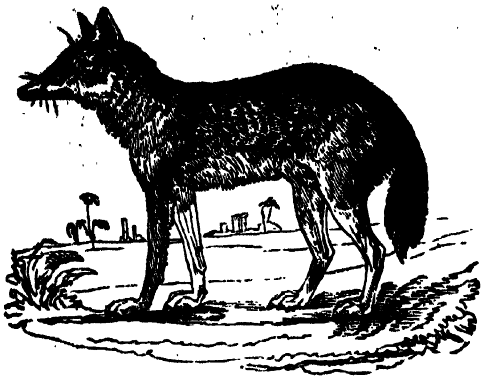


903 —Wolf



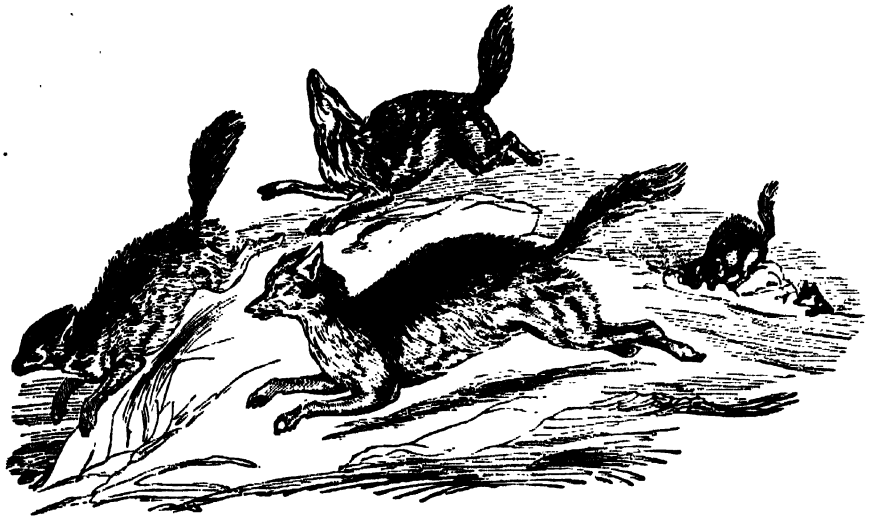
909 —Skull of Jackal.

ed of Dog and Wolf.



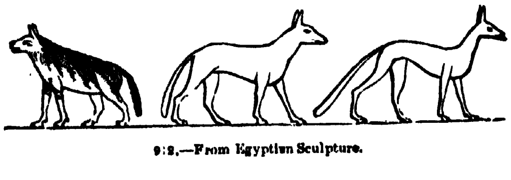
917.—Jackal.

919.—Wolf and Lamb.



Jackals.—916.

910.—Head of Wolf.



912.—From Egyptian Sculpture.

of Melville Peninsula, states that both English and Esquimaux were accustomed to pass them without any weapon, or even a stick; "the animals, however, exhibited no symptoms of fear, but rather a kind of tacit agreement not to be the beginners of a quarrel, even though they might have been certain of proving victorious."

These wolves hunt in packs, and when pressed for food their audacity is astonishing. They will seize the Esquimaux dogs, before their masters' faces, and carry them off—for though bold in attacking the bear, this breed of dogs, as previously noticed, fears the wolf, and makes but a slight resistance They have been known not only to steal provisions from under a man's head in the night, but even to come into a traveller's bivouac and carry off some of his dogs. "During our residence at Cumberland House, in 1820," says Dr Richardson, "a wolf which had been prowling round the fort, and was wounded by a musket ball and driven off, returned after it became dark, whilst the blood was still flowing from its wound, and carried off a dog from amongst fifty others, that howled piteously, but had not courage to unite in an attack on their enemy."

The American Wolf is extremely cunning, and in attacking moose or Wapiti deer, animals which exceed it in speed, it has recourse to a singular stratagem. Several combine, and arrange themselves in the form of a semicircle, and thus advance upon their prey, so as either to hem it in or drive it over a precipice. Captain Franklin often found the remains of deer which had been thus dashed down steep cliffs and devoured, and he states that this is a frequent expedient when the plains are bounded by precipitous cliffs "Whilst the deer are quietly grazing, the wolves assemble in great numbers, and, forming a crescent, creep slowly towards the herd, so as not to alarm them much at first; but when they perceive that they have fairly hemmed in the unsuspecting creatures, and cut off their retreat across the plain, they move more quickly, and with hideous yells terrify their prey, and urge them to flight by the only open way, which is towards the precipice, appearing to know that when the herd is once at full speed, it is easily driven over the cliff, the rearmost urging on those that are before. The wolves then descend at leisure, and feed on the mangled carcasses"

On one occasion a troop of wolves endeavoured to put the same stratagem into practice against Dr. Richardson Having the first watch, he "had gone to the summit of a hill, and remained seated, contemplating the river that washed the precipice under his feet, long after dusk had hid distant objects from his view His thoughts were perhaps far distant from the surrounding scenery, when he was roused by an indistinct noise behind him; and on looking round, perceived that nine white wolves had ranged themselves in form of a crescent, and were advancing apparently with the intention of driving him into the river. On his rising up, they halted, and when he advanced, they made way for his passage down to the tents'

In the dreary realms that advance into the Polar Sea,

> "Where the wolf and Arctic fox
> Prowl amidst the lonely rocks,"

Captain Franklin and his companions, during their arduous journeys, were often obliged to dispute their scanty food with the lean wolves, that would scarcely retreat. On one occasion, when they had captured a moose deer, and had buried a part of the body, the wolves absolutely dug it out from their very feet, and devoured it while the weary men were sleeping. On another occasion, when the travellers had killed a deer, they saw by the flashes of the Aurora borealis eight wolves waiting round for their share of the prey Sometimes, however, the wolves were their caterers, and helped them to a welcome meal. When a group of wolves and a flight of crows were discovered, the travellers knew there was a carcass to be divided, and they sometimes succeeded in obtaining a share of the prey, if it had been recently slaughtered

Of the American wolves we may notice the Prairie wolf (Canis latrans, Say), which inhabits the plains of the Missouri and Saskatchewan, as well as those of the Columbia. It is smaller and fleeter than the common wolf, associates in large troops, and dwells in burrows on the plains remote from the forests. In Mexico is found a distinct species of wolf (Canis Mexicanus, Desm.); and a species termed the red wolf (Canis jubatus, Desm) inhabits the Pampas of La Plata. The Antarctic wolf (Canis Antarcticus, Desm.) is a native of the Falkland Isles, and seems to be an intermediate link between the wolves and foxes. It feeds principally upon a species of goose (anser leucopterus), goes in packs, which wander about by day, but more commonly in the evening, and dwell in holes which they burrow. This species is about fifteen inches in height at the shoulder; the tail is short, and white at the tip; the limbs are short, but the contour of the head is wolf-like. It is termed by Pennant the Antarctic Fox.

Colonel Sykes has described a wolf from Dukhun, under the title of Canis pallipes, which he states to be numerous in the open stony plains of that region, but not to be met with in the woods of the Ghauts. ('Zool. Proceeds.' 1830.)

Mr. Hodgson notices the common European wolf as occurring in the lower region of the Nepâl Mountains.

916, 917.—The Jackal

(*Canis aureus*). Of the animals known by the name of Jackals, one species (Canis Anthus) is a native of Senegal, another, the Cape jackal (Canis mesomelas) is a native of the Cape of Good Hope, and a third, the common jackal (Canis aureus), is spread from the north of Africa, through Syria, Persia, and the greater part of India. Colonel Sykes states it to be numerous in Dukhun, where it is called Kholah by the Mahrattas. It is somewhat larger than a fox, but its tail is shorter in proportion, reaching only to the hock; its head is short, with a pointed muzzle; the general colour above is grey, abruptly divided from a paler tint spread over the under surface, the tail is slightly tipped with black.

This animal is most probably the Shual of the Scriptures. It is the Chical of the Turks, Sciagal, Sciugal, Sciachal, or Shacal of the Persians.

The jackal dwells in troops, which lie concealed in holes and burrows during the day, but come forth at night to hunt for food, giving chase to sheep or antelopes and other animals, like the wolf, stealing fox-like into fowl-roosts, and attacking any animal they are capable of overcoming. They do not, however, confine themselves to living prey, carrion and offal of every description being greedily devoured Nor are roots and fruits less acceptable, in the vineyard, indeed, they make great havoc, and their fondness for grapes is notorious. The "shriek" of the jackal is terrific. Those travellers who have heard them, describe the nocturnal yells of these animals as extremely piercing and dissonant, now close, now at a distance, troop answering troop from different points, themselves unseen, while their fearful chorus breaks the stillness of the hours of darkness Their cries thus heard amidst the ruins of cities of ancient date might seem "to listening Fancy's ear" like the wail of legions of spirits over the departed glories of other days. Mouldering ruins, fallen temples, crumbling tombs, and craggy rocks are the abodes of the jackal.

Sly and suspicious in its disposition, this animal when taken young is nevertheless easily tamed, and loses that unpleasant odour which renders the wild animal almost unbearable We have seen in the Zoological Gardens a hybrid between the jackal and dog.

920, 921 —The Common Fox

(*Canis vulpes*, Linn.; *Vulpes vulgaris*, Brisson). Volpe of the Italians, Rapasa, Spanish, Raposa, Portuguese, Fuchs, German, Vos, Dutch, Raff, Swedish, Rev Danish, Tod, Scottish provincialism, Llwynog, and female Llwynoges, of the Welsh

The common fox (the representative of the sub genus Vulpes, characterized by a linear pupil and a long bushy tail) is too well known to need a minute description This wily animal is common in our island, and in most parts of Europe, extending into Northern Asia, and is everywhere celebrated for its cunning and rapacity As its linear pupil intimates, the fox is crepuscular or nocturnal in its habits, but is occasionally seen abroad during the day In general, however, it is as the dusk of the evening advances that the fox steals from its burrow, with noiseless steps, to prowl about for prey. His senses of smell and hearing are extremely keen, and he listens, and snuffs the breeze, attentive to every sound, appreciating every odour. His eyes gleam, as he creeps along in a crouching attitude, intent upon his prey. His movements are all stealthy. he surprises the rabbit gambolling near its burrow, the hare in her form, the poultry on the perch. He slaughters all he can, reserving the overplus for a future exigency, and for that purpose buries it in the earth. In times of scarcity field-mice, frogs, weasels, and even insects are devoured. On the Continent the fox visits the vineyards, being as partial to the ripe grapes as is the jackal.

The fox is solitary in his habits, and dwells alone in a burrow, which he has either made or usurped, and which is generally in some secluded situation, not readily to be discovered, and in the neighbourhood of a rabbit-warren, preserves of game, or farms. The female breeds in April, and on her alone devolves the entire care of the cubs. She produces three or four at a birth, in a deep burrow, where she has prepared a bed of dried leaves, grass, and moss. The young are very playful, and remain about four months with their parent, who is watchful and resolute to the extreme in their defence. Even when taken at an early age, the fox is not easily tamed, never loses its innate suspiciousness, and never becomes truly domestic; adults are ferocious when placed in confinement, and soon die. Though slightly made, the fox is very vigorous, and bites with great severity. Its power of endurance and its speed have in our country recommended it to all lovers of the chase, for whose gratification the breed is preserved, where possible. Foxes have been known to run before the hounds fifty miles at a stretch: when hard pressed, the animal neither loses his courage nor self-possession; he puts in practice every expedient which cunning dictates, to baffle the hounds or conceal him from their search, and it all fail, he dies defending himself to the last, without uttering a cry.

The voice of the fox is a sort of yelp, which, however, it only occasionally exerts, and never when in quest of prey. It is said by Bewick, and we have often heard it affirmed, that the fox breeds with the dog; and have seen sharp-nosed dogs called fox-dogs, and were at the same time assured that they were a cross between the two animals, but it has always so happened that the assertion could not be substantiated.

In Italy there exists an allied species of fox (Canis (vulpes) melanogaster) closely allied to the common species To Dr. Ruppel we are indebted for a knowledge of the Vulpes famelicus, the Vulpes variegatus, and the Vulpes pallidus, natives of Nubia and the adjacent territories.

922.—The Egyptian Fox

(*Canis Niloticus*). In Egypt and Syria there is a species of fox, called Tahaleb by the Copts, Sabora by the Arabs; it is the Canis Ægyptiacus of Sonnini; the Canis Niloticus of Geoffroy.

It is the size of our common fox, but the ears are wider apart and longer, and it stands somewhat higher on the limbs. Foxes apparently of this species are very abundant in the stony country about Bethlehem, and are also numerous near the convent of St John in the desert, especially about the vintage time, and are then very destructive in the vineyards, which must be strictly watched in order to prevent their incursions These animals live in burrows, and have the general habits of the common European fox, to which they are nearly related.

923.—The Caama

(*Canis Caama*) Of the African foxes, which are numerous, our pictorial museum presents us with a specimen of the Caama of the Cape of Good Hope (Canis (vulpes) Caama), one of the smallest of its race. A few individuals of this species are to be met with within the limits of the colony, but its favourite residence seems to be more to the northward, though there it is becoming less and less numerous, owing to the skins being much in request among the natives as a covering for the cold season So important are these skins considered, that many of the Bechuanas are solely employed in hunting the animal down with dogs, or laying snares in the places to which they are known to resort. In common with other foxes this is a great enemy to birds which lay their eggs upon the ground, and its movements in particular are closely watched by the ostrich during the laying season

When the caama has surmounted all obstacles in procuring eggs, he has to encounter the difficulty of getting at their contents; but even for this difficulty his cunning finds an expedient, that, namely, of pushing them forcibly along the ground, until they come in contact with some substance hard enough to break them, when the contents are speedily disposed of. The natives, from having observed the anxiety of the ostrich to keep this animal from robbing her nest, avail themselves of this solicitude to lure the bird to its destruction; for, seeing that it runs to the nest the instant a fox appears, they fasten a dog near it, and conceal themselves close by, and the ostrich, on approaching to drive away the supposed fox, is frequently shot by the concealed hunter.

Of the Asiatic foxes we may notice the small Indian insectivorous fox (Canis Bengalensis), found in Bengal, and also in the Nepâl hills: the fox of the Dukhun, called Kokree by the Mahrattas (Canis Kokree, Sykes), and the hill fox of the Himalayan Mountains (Canis Himalaicus), remarkable for the beauty of its fur. It is not uncommon in Doon and in Kumaon. (See 'Proceeds. Zool. Soc.' 1836, p. 103.)

924.—American Red Fox

(*Canis fulvus*, var. *decussatus*). It has been the opinion of many naturalists, and even of Cuvier, that the European fox extends over the northern portion of the American continent; we consider, however, that the red fox (Canis (vulpes) fulvus) of that portion of the globe to be a distinct species. It differs from its European congener in the same points and degrees as does the wolf of the one country from that of the other. The American fox is in fact to be distinguished by the breadth of its feet, and their consequent capacity for progression on the snow, and by the quantity of long hair clothing the back part of the cheeks, which, in conjunction with the shorter ears and nose, gives the head a more compact appearance. The red fox has a much finer brush than the European, and is altogether a larger animal. The fur of the body is full, long, soft, and of a bright rufous brown; the skin is therefore valued as an article of trade, and about eight thousand are annually imported into England from the fur countries, where the animal is very abundant, especially in the wooded parts. It is not, however, confined to the colder latitudes; its range, in fact, extends throughout the whole of the United States. In habits and manners the red fox agrees with our common Reynard, but possesses neither the same wind nor the same vigour and power of endurance.

"It runs," says Dr. Richardson, "for about a hundred yards with a great swiftness, but its strength is exhausted in the first burst, and it is soon overtaken by a wolf or a mounted huntsman." Foxes of various gradations of colour, termed Cross Foxes, are common in the fur countries of North America. These are considered by Dr. Richardson and most naturalists to be varieties of the red fox, and such is the opinion of the native hunters, than whom none are more likely to possess accurate knowledge on such points. Fig. 924 represents the ordinary cross fox, distinguished by a grey fur mingled with black, which latter colour prevails over the shoulders. A rarer and more valuable variety is the Black or Silver Fox (Canis fulvus, var argentatus). Dr. Richardson states that seldom more than four or five of this variety are taken in a season at one post, though the hunters no sooner find out the haunts of one than they use every art to catch it, because its fur fetches six times the price of any other fur produced in North America. This fox is sometimes found of a rich deep glossy black, the tip of the tail alone being white: in general, however, it is silvered over ("sable silvered"), the end of each of the long hairs of the fur being white, producing a beautiful appearance. A fine specimen is preserved in the Museum of the Zool Soc.

The Virginian Fox Vulpes Virginianus) appears to be a distinct species, and so most certainly is the Kit, or Tricoloured Fox (V. cinereo-argentatus), of which the skins are common in the shops of furriers This animal is of small size, and is numerous on the plains extending from the Saskatchewan to the Missouri, and on those of Columbia It prefers the open country, at a distance from wooded districts, where it dwells in deep burrows of its own excavation, and is extremely vigilant and fleet. Dr. Richardson suggests that it may be regarded as the American representative of the Corsac Fox of the deserts of Tartary, being similar to that species in habits and manners, and frequenting localities of the like character.

925.—The Arctic Fox

(*Canis* (Vulpes) *Lagopus*) Terreanee-arioo of the Esquimaux of Melville Peninsula, Terreniak of the Greenlanders; Wappeeskeeshew-makkeeshew of the Cree Indians; Peszi of the Russians.

In the high northern latitudes of the globe the Arctic fox is the sole representative of its race. Its range extends through Siberia, along the borders of the Arctic Ocean, through the bleak regions of the Esquimaux and the dreary realms of Greenland.

"These foxes," says Dr. Richardson, "inhabit the most northern lands hitherto discovered." In North America their southern limit appears to be about latitude 50°. They are numerous on the shores of Hudson's Bay, north of Churchill, and exist also in Behring's Straits. They breed on the sea-coast, and chiefly within the Arctic circle, forming burrows in sandy spots, not solitary, like the red fox, but in little villages, twenty or thirty burrows being constructed adjoining to each other. We saw one of these villages on Point Turnagain, in lat. 68½ degrees. Towards the middle of winter they retire southwards, evidently in search of food; keeping as much as possible on the coast, and going much farther to the south in the districts where the coast-line is in the direction of their march. Captain Parry relates that the Arctic foxes, which were previously numerous, began to retire from Melville Peninsula in November, and that by January few remained. Towards the centre of the continent, in lat. 65°, they were seen only in the winter, and then not in numbers. They are very scarce in lat. 61°, and in lat. 53° two only were seen in forty years! "Hearne says that when taken young the Arctic fox may be domesticated in some degree, but he never saw one that was fond of being caressed." Though not destitute of intelligence, the Arctic fox, unlike the common fox, is unsuspicious and destitute of caution: it has been known to stand by while the hunter was preparing a trap, and on his retiring to run headlong into it. Captain Lyon received fifteen from a single trap in four hours. The voice of this species is a kind of yelp, and when a man approaches their breeding-places, they put their heads out of their burrows and bark at him, allowing him to come within range of shot. They appear to have the power of decoying other animals within their reach by imitating their voices

"While tenting," says Captain Lyon, "we observed a fox prowling on a hill side, and heard him for several hours afterwards in different places imitating the voice of a brent-goose." Eggs, young birds, blubber, and carrion of any kind constitute the food of this fox—especially different species of lemmings, which are greedily devoured. In general form the Arctic fox resembles the European species, but is considerably smaller, and, owing to the great quantity of white woolly fur with which it is covered, is somewhat like a little shock-dog The brush is large and full, affording an admirable covering for the nose and feet, to which it acts as a muff when the animal sleeps. Although the head is not so pointed as in our English species, yet it has that air of slyness which is so characteristic of all foxes. The eyes are clear and bright, and of a hazel colour

Captain Lyon remarks that the muzzle of the female is shorter than that of the male, and has less of cunning and more of mildness in its expression. The ears are short, and thickly covered with hair, and their edges appear as if they had been cropped The cheeks are ornamented by a projecting ruff, which extends from behind the ears quite round the lower part of the face, to which it gives an agreeable appearance. The legs are rather long than otherwise, and show great strength of muscle. The feet, which are large, are armed with strong claws "When the animal is standing still, the hind legs are so placed as to give the idea of weakness in the loins, which is certainly not the case, as few animals can make more powerful leaps The general weight is about eight pounds, although some were found to be as low as seven, and a few as high as nine pounds and a half when in good case."

The Arctic fox is cleanly, and free from any unpleasant smell it is habitually watchful, and when asleep, opens its eyes at the slightest noise near it Day is its season of rest: during the night its activity is extreme, and it gambols or hunts for food till day break. While in pursuit of its prey it is mute, but in captivity, or when irritated, it utters a short sharp bark. When first taken its rage is ungovernable, nor is it ever thoroughly reconciled to confinement Those which Captain Lyon had were observed to hide their food, like the dog, under lumps of snow, snow also was their substitute for water, and they would roll in it with evident satisfaction "When the snow was slightly scattered on the decks, they did not lick it up, as dogs are accustomed to do, but by repeatedly pressing with their nose, collected small lumps at its extremity, and then drew it up into the mouth with the assistance of the tongue" Though a few Arctic foxes remain white during the summer, it is only in the winter that the majority assume this pure snowy livery, accompanied by an increase in the fulness and thickness of the fur, which deeply covers even the soles of the feet. In summer the fur is thinner, and of a dusky brownish ash or leaden tint; and the callous pads of the toes become partially visible

926—The Fennic

(*Megalotis Fennecus*). Canis Zerda, Zimmermann. Megalotis Cerdo, Illiger; Fennecus Cerdo, Lacepede, Viverra aurita, Blumenbach, Fennec of the Arabs, Bruce.

For our first knowledge of this elegant little animal we are indebted to the celebrated Abyssinian traveller Bruce, who discovered it in Nubia. So little, however, was its true character understood, that in the third volume of the Supplement to Buffon's work it is termed "animal anonyme,' and even M. Geoffroy for some time regarded it as identical with the Senegal Galago. in fact the French naturalists were disposed to sink the fennec as a new species of canis altogether. Colonel Denham, however, recognized the animal in the interior of North Africa, and accurately figured it in the Zoological Appendix to his Travels: he also brought a specimen to this country, and thus established the truth of Bruce's description. Ruppell re-discovered it in Nubia, where Bruce had first seen it. A preserved specimen and a perfect skeleton, both in excellent preservation, are among the riches of the Museum of the Zoological Society. A detailed account of the osteology of this animal, drawn up by Mr. Yarrell from this skeleton, will be found in the third volume of the 'Zoological Journal.' Whoever examines the skeleton of the fennec will not hesitate for a moment as to the place in nature which the animal occupies. The skull, the teeth, the feet, declare it at once to belong to the Canine group. The fennec frequents the sandy desert tracts of Nubia, and other districts of Northern Africa, dwelling in burrows of its own excavation. It is said to live much on the fruit of the date, and to climb trees in order to obtain its food: this fact, if true, is very remarkable, being a marked departure from the habits and manners of the rest of the present family. Bruce, indeed, says that it builds its nest in trees, and does not burrow in the earth; but this statement is contradicted by M. Ruppell. The individual which Bruce had in his possession while at Algiers was fond of dates or any sweet fruit, and was also partial to eggs. He would eat bread when hungry, especially if sweetened with honey or sugar. The sight of a bird aroused him to eager watchfulness as long as it was present, and a cat was his aversion. He would endeavour to hide from the latter, and never showed a disposition to resist or defend himself The animal was disposed to sleep by day, but as night came on became restless to excess It was never heard to utter any sound.

The fennec is small and slightly made, with slender limbs. The length of the head and body is about thirteen inches, that of the tail eight; the head is narrow, the muzzle pointed, the pupil of the eye large and black, the iris deep blue, whiskers long and thick The ears are extremely large, as long as the head, broad at the base, erect and pointed The fur of the body is rather short, but full and silky. The colour is uniform pale fawn or cream colour, passing into white beneath, the inside of the ear is fringed with long white hairs, the whiskers are white In the districts of Benni Mezzab and Werglah, where the date grows, the fennecs are hunted for their skins, for which, according to Bruce, there is a market at Mecca, whence they are exported to India.

In the sub genus Megalotis, Cuvier associates with the fennec a species from South Africa, the Canis Megalotis of De Lalande (Megalotis Lalandii, H Smith). This animal is somewhat less than the common fox, but comparatively higher on the limbs, its general colour is yellowish grey, but the feet and tail, together with a stripe down the spine, are black the ears are large and spreading.

927 The Cape Hunting-Dog

(*Lycaon tricolor*, Brookes) Canis pictus, Desmarest, Hyæna venatica, Burchell This daring and ferocious animal, one of the pests of Southern Africa, is a complete dog, or canis, in the form of the skull and the characters of the teeth; it has, however, as in the hyænas, only four toes on the anterior feet, and the same on the feet behind. In figure it is tall, lightly built, but muscular and well proportioned, the limbs are long, the ears large and erect, the jaws powerful, and the teeth strong Its aspect is wild and fierce, and its disposition treacherous. The fur is close and of a sandy yellow, irregularly clouded and blotched with black and a little white The tail is somewhat bushy and of moderate length. The colour is subject to variation.

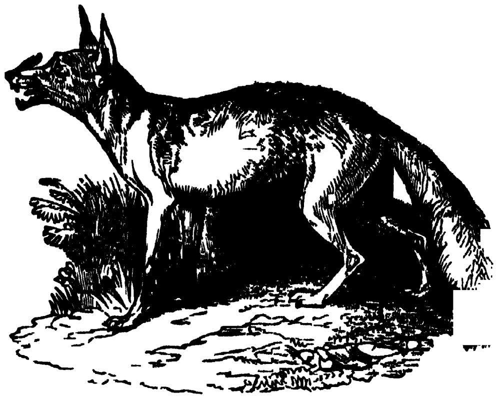
Wild, fleet, and savage, this species hunts in packs mostly during the night, but frequently in the day, and so fleet is it that few animals can escape. It often commits extensive ravages on the flocks and herds of the farmer, though it seldom attacks horned cattle openly, but steals on them while asleep, and bites off their tails, even at the root, with one snap, a feat which the wide gape and vast power of its jaws enables it to do with ease. Mr. Burchell, on his return from Africa, brought a living individual to England, which retained during life all its native ferocity. The preserved skin is in the museum of the Zoological Society. A specimen in the Tower some years since arrived in company with a young Cape lion, both occupying the same den, till the lion became too strong and rough in his play, when the hunting-dog was associated with a striped hyæna and two of the spotted species, with which it agreed tolerably well.

It is generally the opinion of naturalists that this species, for which the celebrated anatomist, the late Joshua Brookes, Esq., founded the genus Lycaon, is an intermediate link in the chain of the Carnivora, uniting the canine group to the hyænas, indeed, in some points of general aspect, and in the number of the toes, the approximation of this dog to the latter animals is so marked, that Mr. Burchell regarded it as a hyæna, and as such Temminck described it under the title of Hyæna picta, though he afterwards assigned it to the genus Canis. The name of Hyæna-dog has also been conferred upon it, but as Mr. Swainson gives this title to the Aard-wolf (Proteles), we drop it altogether for the sake of avoiding confusion or misapprehension.

In size the Cape hunting-dog (Wilde Honden of the Dutch colonists) is as large as a pointer or hound, but higher on the limbs in proportion to the bulk of the body. We are not aware that any serious attempts have been made to domesticate it

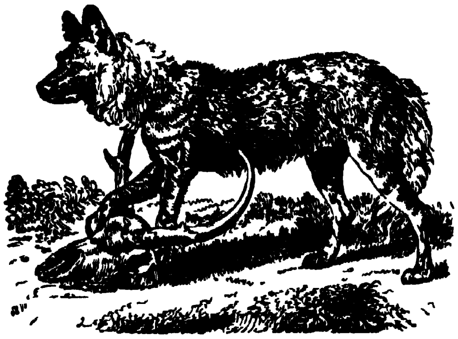
920.—Common Fox.

925.—Arctic Fox.

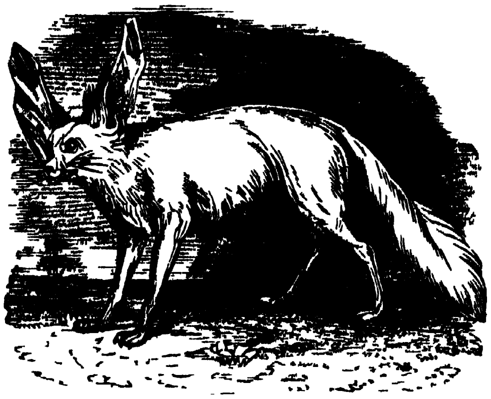


923.—Caama.

924.—American Red Fox.



927.—Cape Hunting Dog

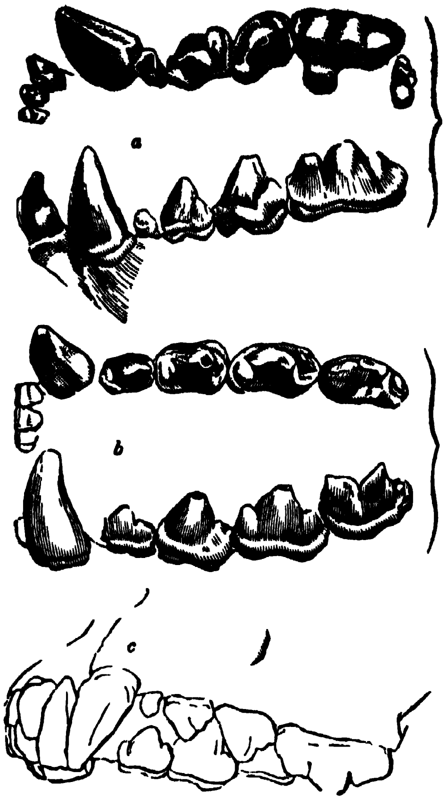


926.—Fennec

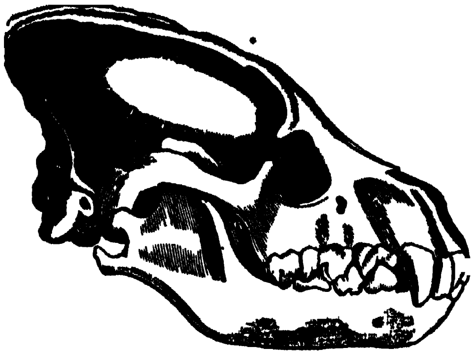
921.—Common Fox.

922.—Egyptian Fox.

922.—Striped Hyæna



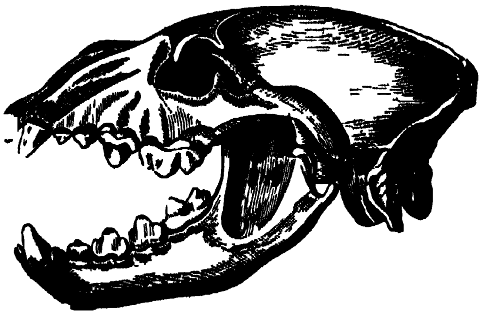
928.—Teeth of Hyæna.



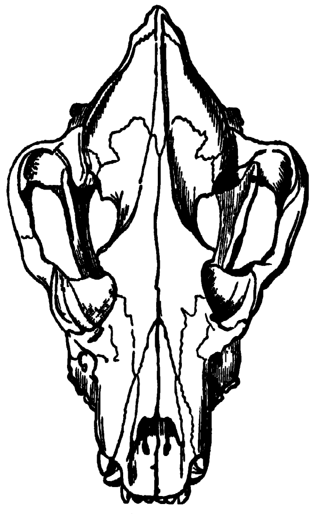
931.—Skull of Striped Hyæna.

925.—Spotted Hyæna

932.—Proteles, or Aard Wolf

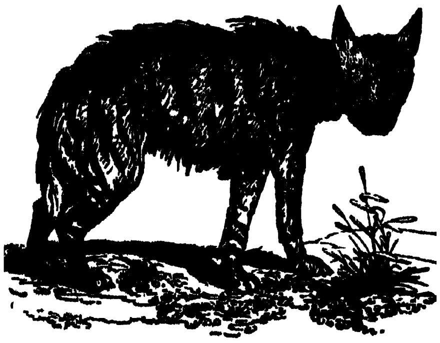


929.—Skull of Spotted Hyæna



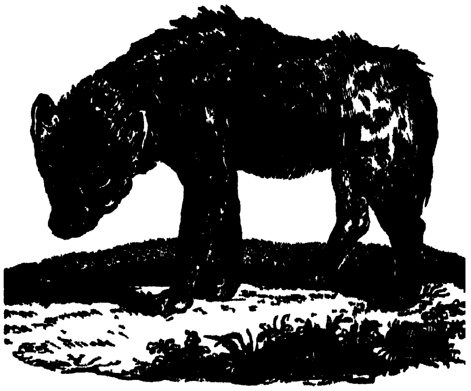
930.—Skull of Spotted Hyæna.

924.—Striped Hyæna.



923.—Striped Hyæna.

927.—Villose Hyæna



926.—Spotted Hyæna.

We are led from the Canine family, through the Lycaon, or Hunting-Dog of the Cape, to the true Hyænas, which form a section of the family Viverridæ, comprising the Civets, the Genets, the Ichneumons, and the Paradoxures. Destined for a life of rapine, the Viverridæ are active and vigorous; in general, the body is rather elongated, the head somewhat conical, the muzzle often acute, the eyes oblique, and the tongue rough, with retroverted horny papillæ. In most groups, the feet are digitigrade; in some, semi-plantigrade. Many are remarkable for a strongly scented musky secretion, prepared in certain glandular sacs. Nocturnal or crepuscular in their habits, they emerge from their retreats with the close of day, and begin their prowl in quest of food. Of restless, wild, and savage temper, they are by no means destitute of intelligence, and are even capable of being domesticated. The Viverridæ approach, through the hyæna, on one part, to the Canine race; they are through other links allied to the Ursidæ, the Felidæ, and the Mustelidæ.

Genus *Hyæna*.—Dentition.—Incisors, $\frac{6}{6}$, Canines, $\frac{1-1}{1-1}$, False Molars, $\frac{3-3}{3-3}$, Carnassières, or Laniary Molars, $\frac{1-1}{1-1}$, Tubercular Molars, $\frac{1-1}{0-0} = 34$.

Fig. 928 shows the dentition of the hyæna: *a*, teeth of the upper jaw in two views; *b*, those of the lower in two views; *c*, the teeth of both jaws together. Fig. 929 represents the skull of the Spotted Hyæna in profile; Fig. 930, the skull of the same animal viewed from above; Fig. 931, the skull of the Striped Hyæna in profile. The skull of the hyæna is remarkable for its solidity: the muzzle is short, the zygomatic arch of vast strength and thickness, and the sides of the cranium are compressed, and sweep up to a high longitudinal ridge, which projects far back from the occiput, affording space for an immense mass of the temporal muscles, which, with those of the neck, are greatly developed. According to Cuvier, the vertebræ of the neck are sometimes found to be anchylosed, or soldered together, in consequence of the violent and continual strain to which they are subject, and hence probably arose the belief that these vertebræ in the hyæna were one solid piece.

In the port and figure of the hyæna there is something very remarkable. The neck, chest, and shoulders are amazingly robust, but the hind-quarters are low, from the crouching posture of the hind-legs, which may be termed knock-kneed, the heel-joints approaching each other. The movements of these limbs are of a dragging character, influencing the pace of the animal, which, though rapid, is a sort of awkward shuffle. The toes are four on each foot, furnished with blunt stout, unretractile claws. The ears are large and erect, a full mane runs down the spine; there is a deep glandular subcaudal pouch; the pupil is somewhat oblong; the tongue rough; the habits are nocturnal.

The hyænas were not separated by Linnæus from the genus Canis, but subsequent naturalists have placed them in various groups according to their views of affinity. We believe them to form a group of the Viverridæ.

Three distinct species are known.

932, 933, 934.—The Striped Hyæna

(*Hyæna vulgaris*, Desm.) Hyæna striata, Zimmermann. H. orientalis, Tiedem., H. Antiquorum, Temm., Canis Hyæna, Linn. This species is a native of Asia and of northern and central Africa. It is found in the Caucasian and Altaic mountains, in Asiatic Turkey, in Syria, Turkey, Persia, India, and in Barbary, Arabia, Egypt, Nubia, Abyssinia, Soudan, Senegambia, &c.

We may here premise, that much of what relates to the striped hyæna, so extensively spread, applies equally to the other species, which appear to be confined exclusively to South Africa. They are all destined to fill up an important station in the economy of nature. It is theirs to put, with vultures and other foul-feeding creatures, to cleanse the earth of putrescent animal matters, and especially of the decaying carcasses of the larger beasts, whose remains, if not speedily removed, would infect the atmosphere with pestilential effluvia. They are Nature's scavengers, and assiduously do they labour in their vocation: they clear the battle-field of the victims of barbarous warfare, gorging on the bodies of the slain; they disinter the dead from the lightly-covered grave; they ransack towns and villages in search of offal; they prowl about the fields, and around the enclosures of human dwellings. The carrion which chance throws in their way furnishes a luxurious meal, nor are the strongest bones unacceptable—such is the power of their jaws, that they crunch the thigh-bone of an ox, for the sake of the marrow it encloses.

Carrion and dead bodies, however, are not their only food; they prey upon horses, sheep, and cattle, often committing extensive depredations; nor are human beings safe from their murderous assaults. They seldom, indeed, attack man openly, and usually avoid a contest with him; but when driven to self-defence, they turn furiously upon their assailant, and combat with determined obstinacy. On the contrary, the sleeping man, woman, or child, which they chance to discover in their nightly prowl, almost certainly falls a victim. Their haunts by day are dens and caves, gloomy rocks, and the ruins of towns and sepulchral monuments of antiquity; there the "fell hyæna" rears her brood. As darkness sets in, these fierce beasts emerge from their lair, and menacing, with teeth displayed and glaring eyes, warn the intruder to a timely retreat.

In some districts the striped hyæna is fearfully numerous. Bruce records that in Abyssinia they were the scourge of the country "both in the city and the field, and appeared to surpass the sheep in number. From evening till dawn of day the town of Gondar was full of them; here they sought the different pieces of slaughtered carcasses which were exposed in the streets without burial. Many a time in the night, when kept late in the palace, on going across the square from the king's house, I have been apprehensive lest they should bite me in the leg. They grunted in great numbers around me, although I was surrounded by several armed men, who seldom passed a night without wounding or slaughtering some of them. One night I went out of my tent, and returning immediately, I perceived two blue eyes glaring at me in the dark; I called my servant to bring a light, and we found a hyæna standing near the head of the bed, with two or three large bunches of candles in his mouth, by keeping which, he seemed to wish at that time no other prey. I was not afraid of him, but with a pike struck as near the heart as I could. It was not until I had done this, that he showed any signs of fierceness; but upon feeling his wound he dropped the candles, and endeavoured to run upon the shaft of the spear to arrive at me; so that I was obliged to draw a pistol from my girdle and shoot him, and nearly at the same time my servant cleft his skull with a battle axe. In a word, the hyænas were the plague of our lives, the terror of our midnight walks, and the destruction of our mules and asses, which are their favourite food." Major Denham gives a similar account. At Kauka, he says, the hyænas are "everywhere in legions, and grew now so extremely ravenous, that a good large village where I sometimes procured a draught of sour milk on my duck-shooting excursions, had been attacked the night before my last visit, and the town absolutely carried by storm, notwithstanding defences of nearly six feet high of branches of the prickly tulloh, and two donkeys, whose flesh these animals are particularly fond of, carried off in spite of the efforts of the people."

Few animals have been the subjects of more false and superstitious opinions, both in ancient and modern times, than the hyæna. Among the writers of antiquity, however, Aristotle accurately describes it, and even explains the popular error current in his day, as it has been since, respecting the bi-sexual character of the animal, an error in which Pliny seems to acquiesce, though he alludes to Aristotle's contradiction of it; but it is evident that he knew nothing himself of the true history of the animal, for, as Cuvier has observed, the Romans were not really acquainted with the animal till at a comparatively late period. Gordian III. is the first, and apparently the only one, of the emperors who imported it; he had ten which were exhibited in the games of Philip, in the year of Rome 1000, or A.D. 247. It is not, in fact, until within the last few years, comparatively speaking, that the moderns have recognised the true hyæna. Belon, who wrote in 1553-4-5, &c., mistook the Civet for it, which animal indeed resembles the hyæna in having scent-pouches, a mane, and a transversely barred or waved style of colouring; yet at the same time that he fell into this error, he was in possession of a good figure of the true hyæna, but, without suspecting the real fact, he gives this under the title of Sea-Wolf, and describes it as an animal from the coasts of England. From the time of Belon to that of Buffon, no naturalist figured the hyæna from nature; and it is only within the last few years that its real character has been understood.

The hyæna has been represented as ferociously untameable: nothing can be more untrue; it is easily domesticated. Bishop Heber saw one in India that followed its master and fawned on him like a dog. Barrow, speaking of the South African Spotted hyæna, states that in the district of Schneuberg it is domesticated and used like a hound for the chace. Colonel Sykes kept a young hyæna tame in India, and brought the animal over to England; he presented it (then full grown, yet gentle as a dog) to the Zoological Society. "In India," says Colonel Sykes, "it was allowed to run about my house, and on board ship it was released from its cage two or three times a day, to play with the sailors and gambol with the dogs. It early recognised my person and voice, would obey when called, and in general was as playful and good humoured as a puppy. My visits to it in the Gardens have been rare and at long intervals, nor have I ever carried it food. I anticipated, therefore, that it would outgrow its early affection, and that I should be to it as any other stranger; but it has always greeted me not only as an old acquaintance, but as an old friend, and if I am to judge from its agitation and peculiar cries, the animal's recognition is that of affection. On Sunday last it was asleep in its cage when I approached. On calling it by its name, it looked up, distinguished me in the crowd, started on its legs, and on my applying my hand to its mouth to smell to, it threw itself down against the bars, rubbed its head, neck, and back against my hand, and then started on its legs, and bounded about its cage uttering short cries. On ceasing to speak to it and moving away, it looked wistfully after me, nor resumed its motions till I addressed it again. Its manifestations of joy were so unequivocal as to excite the surprise of a great number of bystanders." ('Zool. Proceeds.' 1833, p. 76.)

935, 936.—The Spotted Hyæna

(*Hyæna crocuta*). Tiger-wolf of the colonists at the Cape, Hyæna Capensis, Desm., H. maculata, Thunberg.

This species is the nuisance and even terror of South Africa, where it is well known to the farmers, who too often experience the effects of its destructive habits; for it not only devours the carrion which chance throws in its way, but it invades the farmers' pens or folds during the night, and often succeeds in killing or mutilating such of the larger kinds of live stock as have not been secured before dusk. Sickly animals, as we are assured, are less liable to suffer from the voracity of this creature than those which are in full health: the latter by their rapid flight inspiring the enemy with a courage of which by nature he is destitute; whereas the sickly face him, and thus intimidate him. So anxious is he for the flight of animals as a preliminary to his attack, that he uses all the grimace and threatening he can command, to induce them to run, and never dares to attack them unless they do so. The spotted hyæna seldom moves abroad during the day; night is his season of activity, and towards nightfall his howlings are regularly heard, announcing to the various animals that their foe is on his prowl. These dismal sounds appal the timid, and as they are heard on every side around, confuse the affrighted fugitive, who often runs into the danger from which he seeks to escape. Formerly hyænas were in the habit of paying nightly visits to the streets of Cape Town, and even now occasionally approach the town, and their howlings are often heard from the Table Mountain. In the Caffre country they are numerous and daring, approaching the villages, and attempting, either by force or stratagem, to pass the wattles by which the houses are defended. If so far successful, they next attempt to enter the houses, and not unfrequently succeed in carrying off a young child of the family.

Mr. Steedman, in his 'Wanderings and Adventures in the Interior of Southern Africa,' gives most appalling accounts of the rapacity of the spotted hyæna. He states that Mr. Shepstone, in a letter from Mamboland, relates that the nightly attacks of wolves, as the hyænas are generally called, have been very destructive amongst the children and youth, for within a few months not fewer than forty instances came to his knowledge wherein that beast had made a most dreadful havoc. "To show clearly," says that gentleman, "the preference of the wolf (spotted hyæna) for human flesh, it will be necessary to notice that when the Mambookies build their houses, which are in form like beehives, and tolerably large, often eighteen or twenty feet in diameter, the floor is raised at the higher or back part of the house, until within three or four feet of the front, where it suddenly terminates, leaving an area from thence to the wall, in which every night the calves are tied to protect them from the storms or wild beasts. Now it would be natural to suppose, that should the wolf enter, he would seize the first object for his prey, especially as the natives always lie with the fire at their feet; but notwithstanding this, the constant practice of this animal has been in every instance to pass by the calves in the area, and even by the fire, and take the children from under the mother's kaross, and this in such a gentle and cautious manner, that the poor parent has been unconscious of her loss until the cries of her little innocent have reached her from without when a close prisoner in the jaws of the monster." Mr. Shepstone then particularizes two instances within his own knowledge, one of a boy about ten years of age, and the other of a little girl about eight, who had been carried off by this species, and wretchedly

mangled, but recovered by the attention of Mr. Shepstone and his friends.

Various methods are employed for the destruction of this ferocious beast, as snares, pit-falls, traps, spring-guns, &c., but so cunning and suspicious is the animal, that he mostly avoids them.

The general colour of this species is yellowish-brown, with numerous spots, more or less distinct, of a deeper tint; the mane down the neck and back is less full and long than in the striped hyæna, and the hair generally is shorter.

937.—The Villose Hyæna

(***Hyæna villosa***, Smith). Straand-Wolf of the Dutch colonists of the Cape. For our knowledge of this species, which resembles in some respects the Striped Hyæna, we are indebted to Dr. A. Smith, who figured and described it in the fifteenth volume of the 'Linnæan Transactions.' The Villose Hyæna is a native of South Africa, but is by no means so common as the spotted species, and is found chiefly along the sea-coast, but has been observed in the neighbourhood of Nieuveld Mountains, a considerable distance in the interior of the country. The Villose Hyæna, or Straand-Wolf, devours carrion, and such dead animal substances (whales for instance) as the sea casts up; but when pressed by hunger its habits seem to resemble those of the other species, for it then commits serious depredations on the flocks and herds of the colonists, who hold its incursions in great dread. Mr. Steedman, who states this, says that he saw a very fine specimen, which had been shot by a farmer residing in the vicinity of Blauwberg, and was informed that it had destroyed three large calves belonging to the farmer. He adds, that it is said to be a remarkably cunning animal, retiring to a considerable distance from the scene of its depredations to elude pursuit, and concealing itself during the day-time in the mountains, or in the thick bush which extends in large patches throughout the sandy district in which it is usually found.

The Villose Hyæna stands about two feet four inches in height at the shoulder, and measures four feet four inches from the nose to the root of the tail. The hair of the body is long and coarse. Its general colour is dusky-grey, variegated with indefinite clouds or oblique bands of black, the latter prevailing on the limbs.

The fossil bones of extinct species of Hyæna prove the abundance of these animals at one period in our portion of the globe. In the Cave of Kirkdale these relics were found in vast numbers, exceeding those of any other carnivorous animal. They have been discovered also in other places in our island. On the continent they occur in the Cavern of Gaylenreuth, and in most of those where the fossil bones of bears are met with, to which we have already alluded.

938.—The Proteles

(***Proteles cristata***). Aard-Wolf (earth-wolf) of the Dutch colonists of the Cape, Proteles Lalandii, Isidore, Geoffroy; Viverra Hyænoides, Desmarest; Civette Hyénoide of F. Cuvier.

The genus Proteles, which appears to link the Hyænas to the Civets, contains, as far as known, only one species which is a native of South Africa. In general contour and manners this singular animal much resembles the former animals, but is of inferior size: the hinder quarters are low and trailing; the shoulders thick and muscular; while a full coarse mane runs along the side. In dentition it is very remarkable. The molars are $\frac{4-4}{3-3}$, much separated from each other. Of those above, the three first are false, and the fourth is small and tuberculous, with three points. The three molars below have each the character of false molars. Incisors and canines as usual.

On their fore-feet there are five toes, but the thumb is short, rudimentary, and high on the carpus as in the dog; the hinder feet have four toes. The claws are strong, large, blunt, and well adapted for scratching. There are no decided scent-pouches, as in the Civets, but a furrow in their stead. The form of the head more resembles that of the Civets than the Hyænas, being somewhat elongated, and having the muzzle conical and pointed. The ears are long, erect, acute, and thinly covered with hair; the whiskers are strong; the tail is short and bushy, with coarse hair. The body is covered with woolly fur, intermixed with long coarse hairs. The general colour is of a yellowish-grey, radiated with distinct transverse stripes of dusky-black, the mane being waved with black, which is also the colour of the feet and extreme half of the tail. The young are much darker, both in general colour and their markings, than adults. Length of an adult female specimen in the museum of the Zool. Soc., two feet six inches, exclusive of the tail, which is eleven inches. The male is somewhat larger.

The Aard-wolf, or Proteles, is nocturnal in its habits, and constructs a deep burrow, at the bottom of which it lies concealed during the day-time. This subterranean chamber, to which there are three or four different entrances, is usually occupied by several individuals, so that the animal appears to be partially gregarious. Notwithstanding the trailing contour of its hind-quarters, it runs with considerable quickness. when irritated, it erects its mane, like the hyæna. Its food consists of carrion and small animals, not excluding ants, which were found by Sparrman in the stomach of one he killed.

939, 940.—The Civet

(*Viverra Civetta*). The restricted genus Viverra, as established by modern naturalists, contains only a limited number of species, characterized by the possession of a large double sacculus, secreting an unctuous substance of a strong musky odour, by the claws being half retractile, and the pupil of the eye circular during the day. The dentition, similar to that of the Ichneumons (Fig. 941), is as follows:—Incisors, $\frac{6}{6}$, canines, $\frac{1-1}{1-1}$, molars, $\frac{6-6}{6-6} = 40$.

The body is long and compressed laterally, the fur is somewhat harsh, full, and a mane, as in the Proteles, runs along the spine. The head is stout, but the muzzle is elongated, the ears are short, wide, and rounded, the tail is shorter than the body. The eyes gleam in the dark with great brilliancy.

Of nocturnal habits, wild and savage, the animals of this genus are decidedly carnivorous, preying upon birds, reptiles, and small mammalia, which they take by surprise, and exhibit great energy and bodily activity. When taken young they are easily tamed, but adults can never be reconciled to captivity.

The Civet is peculiar to North Africa, and is especially common in Abyssinia, frequenting hilly, uncultivated districts and arid situations. It gives its name to the musky perfume for which all the species are equally remarkable. In figure the civet is robust, but the body is compressed laterally; in size it equals a dog of middle stature, being about twenty-six inches in length, exclusive of the tail, which is thirteen or fourteen inches. Buffon states that in his time numbers were kept in Holland for the commercial advantage of obtaining their odorous secretion, but we are not aware that such is now the case. In North Africa, however, the practice is in vogue. The colour of the civet is dark grey, thickly banded with black; a white stripe runs along the sides of the neck, bounded by a black line above, the throat and sides of the muzzle being black. A thick mane of coarse black hair runs along the neck and back, and continues over the tail, which is consequently somewhat bushy.

In India the Civet is represented by the Zibet (Viverra Zibetha, Linn.; Viverra undulata, Gray), and in Java by the Tangalung (the Tangalunga Padi of the natives). This is the Spotted Civet, Viverra Tangalunga, of Gray, and the V. Zibetha of F. Cuvier, Dr. Horsfield, Sir T. Raffles, who confounded it with the former, from which it is decidedly distinct. It is the Viverra Hardwickii of Lesson.

942, 943.—The Genet

(*Genetta vulgaris*). The Genets are distinguished by a slim and graceful contour, the neck is long, the head is narrow, and terminates in a pointed muzzle, the limbs are short, the ears broad, short, and rounded, the tail lengthened, the pupils of the eyes linear and vertical, the musk-pouches are inconsiderable or reduced to a mere depression.

In their manners, as well as in several anatomical peculiarities, the Genets approximate closely to the Cats. Like those animals they hiss when approached or irritated, spring upon their prey, taking it by surprise, strike and lacerate with their talons, which are completely retractile, and climb trees with ease and rapidity. In the markings and character of the fur also we see a marked approach to the Cats.

The Common Genet is found throughout Africa, and occurs in the South of France and other portions of Europe adjacent to the Mediterranean. It is said to haunt the borders of streams and rivers, especially near their source. This beautiful but fierce animal is easily domesticated, and is kept tame in Constantinople, where it is in repute as a destroyer of rats and mice. Its odour is not very powerful, nor at all disagreeable.

The general colour is greyish-yellow, with black lines down the back, and spotted on the sides with the same; on the cheeks, above the eyes, and on each side of the muzzle, there is a streak of white; the tail is alternately banded with black and white.

944.—The Rasse Genet

(*Genetta Rasse*). Viverra Rasse, Horsfield; Viverra Gunda, Hamilton, MSS. This species, which is a native of Java, appears to be different from the Genetta Indica. According to Dr. Horsfield, it frequents forests of moderate elevation, where it preys upon small birds and animals of every description, and possesses the sanguinary appetite of the animals of this family in a high degree. In confinement it will devour a mixed diet, and is fed on eggs, fish, flesh, and rice. The natives affirm that salt is a poison to it. Its odoriferous secretion is termed *dedes* by the Javanese, and *jibet* by the Malays, and is held in high esteem. In the Museum of the Zool. Soc. there are eight distinct species of the present genus, to which has yet to be added the Fossane of Madagascar.

945.—The Delundung

(*Prionodon gracilis*). This beautiful and singular species, a native of Java, was regarded by Dr. Horsfield as so intimately related to the Cats, that he terms it Felis and assigns it a sectional place in that group. We consider it to be the most nearly allied to the Genets, though destitute of scent-glands, and differing somewhat in the dentition, which is as follows:—Incisors, $\frac{6}{6}$, canines, $\frac{1-1}{1-1}$; molars, $\frac{5-5}{6-6}$. Of the molars above, the first is bicuspid, the second tricuspid, as is the third, the fourth, or carnassière, has an elongated cutting edge, the fifth is tubercular. This jagged form of the teeth has suggested the name of Prionodon, from πριων, 'a saw,' and οδους, 'a tooth.' (See Fig. 946: *a*, an external view of the teeth of both jaws, *b*, an internal view of the same, *c*, front view of the teeth.) The Delundung was discovered in 1806, by Dr. Horsfield, during his researches in the district of Blambangan, at the eastern extremity of Java, where it is very rare, and still more so in other parts of the island. It inhabits the extensive forests with which the district is almost entirely covered. Of its habits no details were collected.

This animal is extremely slender and elongated, with a tapering head and sharp muzzle, a long thick tail, and slender delicate limbs. The eyes are sprightly, the irides brown, the pupils circular. The claws are minute and sharp, and perfectly retractile. The fur is silky at the base, and soft to the touch. The whiskers are very long. The ground-colour is of a delicate yellowish-white; four broad transverse bands of rich blackish brown traverse the back at equal intervals; an interrupted stripe, originating behind the eye and between the ears, passes along the side, and terminates in large spots on the thigh; the shoulder is similarly spotted; and the tail is ringed at regular but increasing intervals. The *tout-ensemble* brings to mind the cloudings on a rich piece of tortoiseshell. Fig. 946 presents a front view of the head, *d*, the fore-foot covered with fur, *e*, the hind foot with the fur removed.

947.—The Cryptoprocta

(*Cryptoprocta ferox*). This remarkable and rare animal is a decided link between the Viverrine and the Feline groups, approaching very nearly to the latter in external characters, and still more so in internal anatomy.

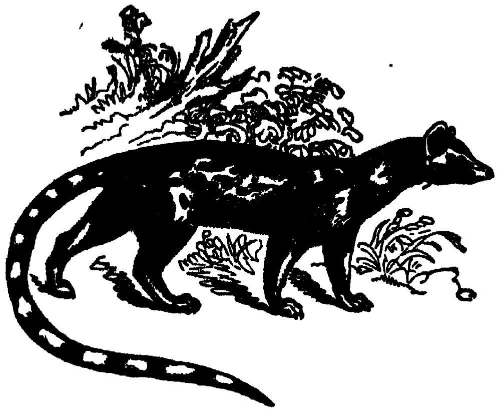
The body is slender, but the limbs are robust and muscular, the head is narrow, the eyes rather small, the ears unusually large and rounded, the toes five on each foot, the tail long. General colour a light brownish-red.

The individual on which Mr. Bennett founded his description was immature, having not yet lost its milk teeth; it was thirteen inches and a half in the length of the head and body, that of the tail being eleven inches and a half.

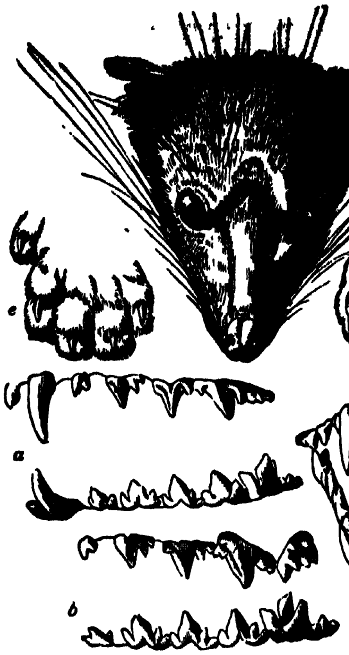
Of the habits of the Cryptoprocta ferox nothing definitely is known. The specimen in question was sent to the Zool. Soc. by Mr. Telfair, President of the Mauritius Natural History Society, who states that he received it alive from the interior and southern part of Madagascar, and that he had not seen in the Mauritius any of the Madagascar people that were acquainted with it. Hence it would seem to be rare. He remarks, "It was the most savage creature of its size I ever met with; its motions, power, and activity were those of a tiger, and it had the same appetite for blood and the destruction of animal life. Its muscular force was very great, and the muscles of the limbs were remarkably full and thick."

948.—The Suricate

(***Ryzæna tetradactyla***, Ill.). Regarding the Proteles as leading to the Hyænas, and the Cryptoprocta to the Cats, another line of the Viverridæ appears to conduct us to the Ferrets, through the Ichneumons. But before we notice these, two remarkable genera claim our attention, each containing a single species, which in form and habits appears to exhibit a cer-

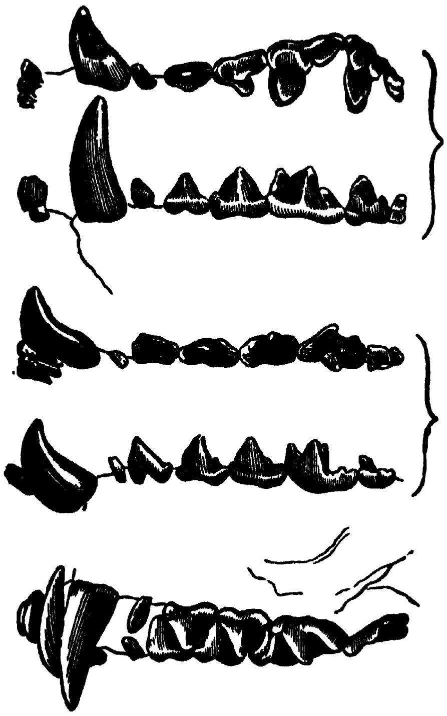


943.—Genet.

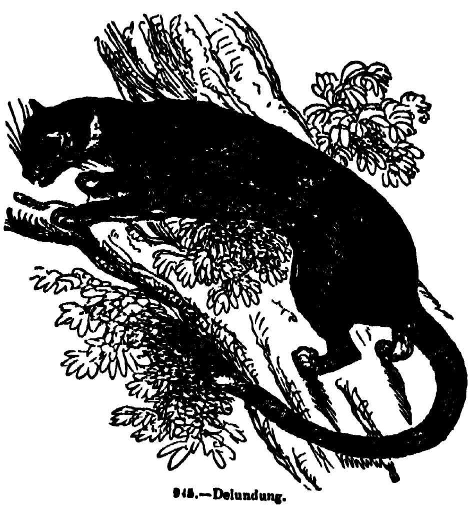


946.—Head, Teeth, and Feet of Delundung.

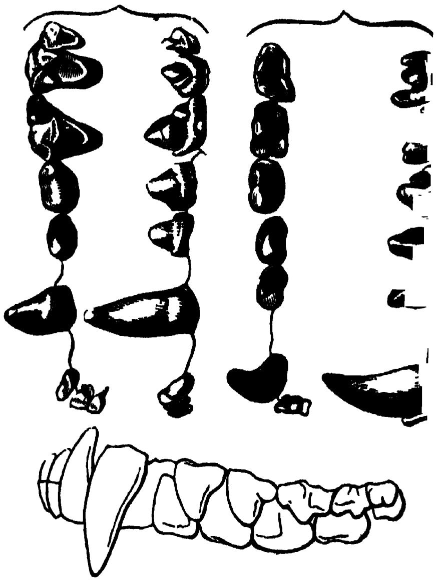
939.—Civets.



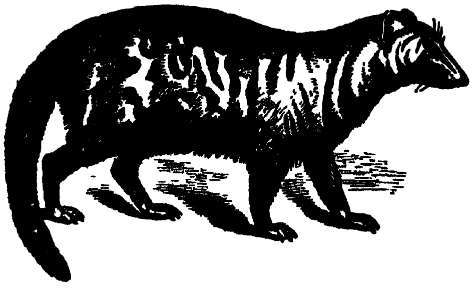
941.—Teeth of Ichneumon.



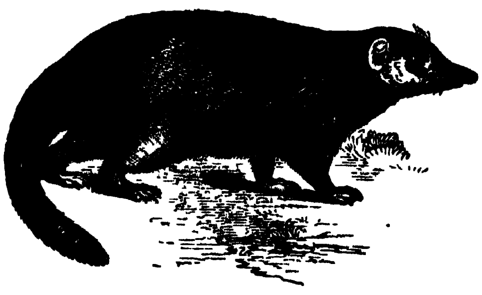
945.—Delundung.



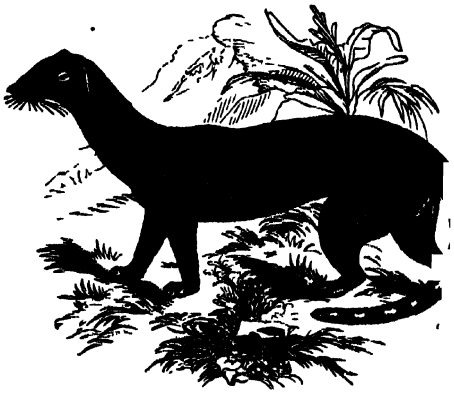
949.—Teeth of Suricate.



940.—Civet.



950. Mangue.



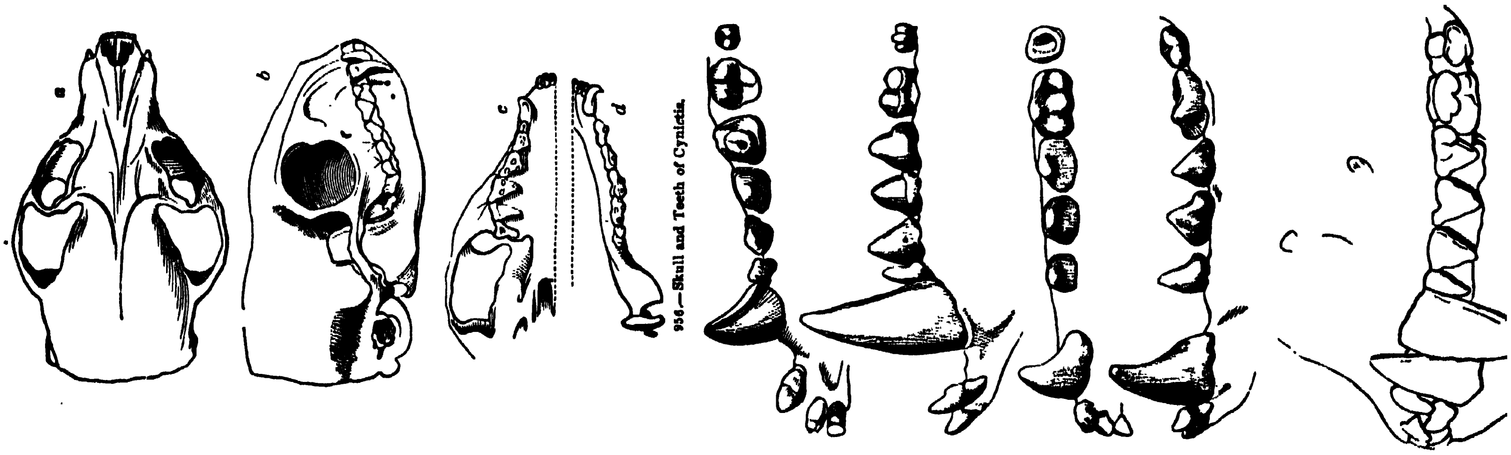
944.—Rasse Genet.

942.—Genet.

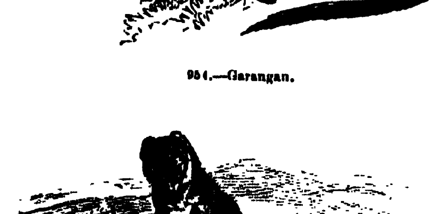
955.—Steedmann's Cynictis.

7.—Paradoxure.

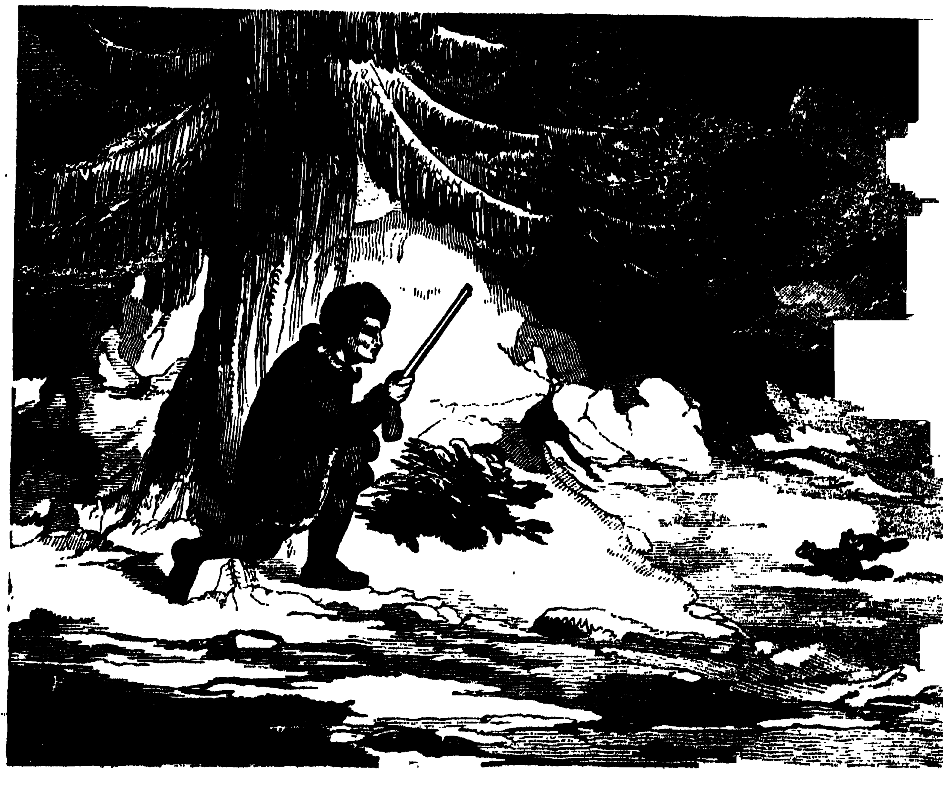
951.—Egyptian Ichneumons.



956.—Skull and Teeth of Cynictis.



954.—Garangan.



tain degree of affinity to the Racoons, having, like those animals, a long, pointed, moveable nose; feet almost entirely plantigrade; eyes obliquely set; the body strongly built, and the habit of sitting up on the haunches, while the fore-paws are employed in holding food. While, however, the approach of these species to the Racoons is discernible, their alliance to the Ichneumons cannot be mistaken. We first select the Suricate. A nose remarkably long, sharp, and flexible; quick, lively, oblique eyes, with circular pupils; and close ears, give a peculiar expression to the physiognomy of the Suricate. The toes on each foot are four, those of the anterior limbs being armed with large hooked claws, miniature copies of those of the Sun-bears. The dentition (Fig. 949) resembles that of the ichneumons, except that there is one false molar less on each side, above and below.

This rare animal is a native of Southern Africa, and is eminently carnivorous in its habits. Its length is about a foot, exclusive of the tail, which is nearly six inches. There are two scent-glands. The general colour is yellowish-grey, waved transversely with dark brown and rufous, the hairs, as in the ichneumons, being ringed with different tints; the tail is rufous-brown, ending in black. The fur is long and rather coarse.

We have had an opportunity of observing two specimens, a male and female, in captivity; they were lively, inquisitive, and docile, but betrayed great excitement when birds or other small animals were presented before their cage, endeavouring to seize or dart upon them. They used their paws with much address, and would sit up, peeping between the wires, or caressing each other, for they exhibited great mutual attachment. The female died first; the male became dull, pined, and shortly followed his companion. The notes of their anatomy, by Professor Owen, are given in the 'Zoological Proceedings' for 1830-31.

950.—The Mangue

(*Crossarchus obscurus*). The Mangue, the only known representative of the genus Crossarchus, is a native of Sierra Leone and other parts of Western Africa. It resembles the Suricate in the form of the head and nose, in dentition, and general structure, internal as well as external. It has, however, five toes on each foot, and is fairly plantigrade. Its general colour is deep chocolate-brown, grizzled with yellowish-white, each hair being ringed with this colour. The individual which we have observed in captivity resembled the Suricate in its habits, and was very intelligent. With respect to its manners in a state of nature we have no particular details. In the 'Zool. Proceeds.' for 1834 will be found our account of the internal anatomy of this animal, compared with that of the Suricate and the Viverridæ in general.

951.—The Egyptian Ichneumon

(*Herpestes Pharaonis*, Desm.). With long agile bodies, small glowing eyes, a pointed nose, long tail, short limbs, and semi-plantigrade feet, the Ichneumons, or Mangoustes, as they are also called (Mangusta, Oliv.; Ichneumon, Geoff.; Herpestes, Illig.), in their general form, no less than in their habits, display a certain approximation to the ferrets, being bold, active, and sanguinary, and unrelenting destroyers of birds, reptiles, and small mammalia, which they take by surprise, darting rapidly upon them. Beautiful, cleanly, and easily domesticated, they are often kept tame in the countries they naturally inhabit, for the purpose of clearing the houses of vermin, though the poultry-yard is not safe from their incursions. The ears are short, wide, and rounded; the hair long, rather coarse and waved or grizzled, each hair being ringed with different tints; the scent-gland is large; the feet are five-toed, the nails sharp and semi retractile; the pupils of the eyes oblong: Fig. 941 gives the dentition. The ichneumons are natives of the hotter parts of the Old World, the species being respectively African and Indian. Night is their season of activity; they then prowl in quest of their prey, stealing along with noiseless step, urged by hunger and the instinct of destruction. The Egyptian ichneumon is a native of North Africa, and was deified for its services by the ancient Egyptians. Its Coptic name is Nems; its Arabic, among the Moors, Serro. Snakes, lizards, birds, crocodiles newly hatched, and especially the eggs of the crocodile, constitute its food; and the ancients believed that it attacked and killed that huge reptile when fully grown. Pliny states that when gorged with food, and lying with the mouth open, a little bird, called Trochilos, enters the jaws of the crocodile to pick the teeth, to the great satisfaction of the monster; and he adds, that the ichneumon, espying him asleep, darts down his throat and tears his inside. We need not enter into any grave refutation of this marvellous account.

The ichneumon is fierce and daring, and glides with sparkling eyes towards its prey, which it follows with snake-like progression; often it watches patiently for hours together in one spot, waiting the appearance of a mouse, rat, or snake from its lurking-place. We have frequently seen the animal sit up like the Suricate while feeding. In a state of domestication it is gentle and affectionate, and never wanders from the house or returns to an independent existence; but it makes itself familiar with every part of the premises, exploring every hole and corner, inquisitively peeping into boxes and vessels of all kinds, and watching every movement or operation. Sonnini, who travelled in 1777-8 9, observes that few or none are now reared in Egypt in a state of domestication; Hasselquist, however, mentions that Mr. Barton, English Consul in Egypt, had a tame ichneumon, and adds that it frequently goes about the houses like a cat. It would appear that, like the polecat, it often depopulates the fowl-roost.

The colour of the Egyptian ichneumon is brownish-grey, each hair being ringed with white and dark tints of brown; the tail tapers towards the extremity, which is tufted and black. Length twenty-one inches, exclusive of the tail, which is eighteen.

953.—The Indian Ichneumon

(*Herpestes griseus*). This species is much less than the Egyptian ichneumon, and of a beautiful freckled-grey. It is common in India, and frequently brought to this country; it is easily tamed, and is inquisitive, active, cleanly, and docile. Mr. Bennett, in his account of one kept in the Tower, says that on one occasion it killed no fewer than a dozen full-grown rats, which were turned out before it in a room sixteen feet square, in less than a minute and a half.

954.—The Garangan

(*Herpestes Javanicus*). According to Dr. Horsfield, this species, termed Garangan by the Javanese, inhabits chiefly the large teak-forests, and its agility is greatly admired by the natives: it attacks and kills serpents with excessive boldness. "It is very expert in burrowing in the ground, which process it employs ingeniously in the pursuit of rats. It possesses great natural sagacity, and, from the peculiarities of its character, it willingly seeks the protection of man. It is easily tamed, and in its domestic state is docile, and attached to its master, whom it follows like a dog; it is fond of caresses, and frequently places itself erect on its hind-legs, regarding everything that passes with great attention. It is of a very restless disposition, and always carries its food to the most retired place to consume it. It is very cleanly in its habits; it is exclusively carnivorous, and very destructive to poultry, employing great artifice in surprising chickens:" hence the natives seldom keep it tamed, nor is it altogether to be trusted, as it is subject to fits of excessive violence. Its mode of encountering serpents was related by the natives to Dr. Horsfield, exactly as it is described by Rumphius, who informs us that the Javanese nobles amuse themselves with these contests. When the two enemies are opposed to each other, the serpent endeavours to twine round the quadruped and kill it; the latter inflates itself to turgescence, and, as the reptile is about to inflict the fatal wounds, contracts its body, slips through the scaly coil, and seizes its foe by the neck. We suspect that in this story some allowance must be made for over-colouring.

955.—Steedman's Cynictis

(*Cynictis Steedmannii*, Ogilb.). The genus Cynictis differs from Herpestes in the number of the toes on the hind-feet being only four, and in the absence of a false molar on the lower jaw. The tail is long and bushy. The characters of the skull and dentition are seen at Fig. 956: *a*, the skull from above; *b*, the same in profile; *c*, the dentition of the upper jaw, *d*, the dentition of the lower jaw.

The Cynictis Steedmannii is a native of South Africa, and appears to resemble the ichneumons in its general habits. It excavates burrows in which it dwells. Though only introduced to our knowledge within the last few years, it was most probably seen by Sparrman and Barrow, the latter of whom describes an animal so closely resembling the present, that there can be no doubt as to their identity. The general colour is foxy red; the tail is bushy, tipped with white. Length one foot six inches, exclusive of the tail, which is one foot. A second species of this genus, Cynictis melanurus, is a native of Sierra Leone; and several others have been lately discovered in South Africa.

957.—The Common Paradoxure

(*Paradoxurus Typus*). The genus Paradoxurus appears to be one of the links which conduct us from the true Viverræ to the aberrant forms of the Ursidæ. This genus is peculiar to India and the adjacent islands. It is characterized by a semi-plantigrade condition of the feet, the greater portion of the sole being naked and callous; the toes, five closely united together by intervening webs; claws short, sharp, and semi-retractile; the pupil linear; a mere fold instead of scent-pouches; molars $\frac{6-6}{6-6}$; nearly resembling those of the Genets; the tail frequently spirally contorted, but not prehensile; the fur full.

In size the paradoxure exceeds a common cat, its total length, including the tail, being three feet. The general colour is greyish black tinged with yellow, and indistinctly banded and spotted with a dusky hue; a whitish streak occupies the cheek below the eye, and another runs above; muzzle black. The paradoxures are to a great extent frugivorous, and are in the habit of climbing trees, which they do with great facility. Dr. Horsfield, in his 'Zoological Researches,' gives a description of the Java paradoxure, or Musang, well worthy of notice. Its manners, he observes, are very similar to those of the Genet. "If taken young, it becomes patient and gentle during confinement, and receives readily animal and vegetable food. It requires little attention, and contents itself with the scanty remains of the meals of the natives, with fish, eggs, rice, potatoes, &c., the structure of its teeth being particularly adapted to vegetable diet. It prefers, however, the delicate and pulpy fruits, but when pressed by hunger attacks fowls and birds. It is most abundant near the villages situated at the confines of large forests, and constructs a simple nest in the manner of squirrels, of dry leaves, grass, or small twigs, in the forks of larger branches or in the hollow of trees. From these it sallies forth at night to visit the sheds and hen-roosts of the natives, in search of eggs, chickens, &c. Its rambles are also particularly directed to gardens and plantations, where fruits of every description within its reach, and particularly pine-apples, suffer extensively from its depredations." The coffee plantations in some parts of the island are greatly infested by it, and on this account it has obtained the name of coffee-rat. It selects the most ripe and perfect berries, and as the seeds pass uninjured through the alimentary viscera, it spreads that plant extensively, and gives origin to splendid groves in various parts of the forests, but particularly on the declivities of hills, thus counterbalancing the injuries it commits. It native name is Leewak.

Fig. 958 represents the dentition of the Binturong (Artitis Binturong, Tem.; Ictides ater, Cuv.). This animal, a native of Java and Sumatra, represents in its own country the kinkajou of the forests of South America. It is a slow, heavy, plantigrade animal, with short limbs, and a long, powerful, prehensile tail, very thick and muscular at the base, and with which it assists itself in climbing, being arboreal in its habits. One that was kept alive many years by Major Farquhar partook both of animal and vegetable food. It is timid and nocturnal, sleeping during the day, and wandering about at night in quest of food. In size it exceeds a domestic cat, measuring two feet five inches in the length of the head and body, the tail being upwards of two feet. Its fur is long and coarse; general colour black; pupils of the eyes linear. Cuvier notices the approximation of these animals to the racoons.

Family Mustelidæ, or the Weasels, &c. Smaller, for the most part, than the animals of the cat tribe (Felidæ), and consequently less formidable as far as man is concerned, but equally carnivorous and sanguinary, the Mustelidæ (we speak of the typical species) are appointed to prey on the multitudinous races of the weak and the timid—such as birds, rabbits, hares, and even fish and reptiles: of slender elongated figure, and with short legs, they appear to glide along, and indeed, from the extreme flexibility and the cylindrical form of their bodies, which enable them to force their way through the smallest openings, they have been termed Vermiform Feræ. They are silent, cautious, and creeping, and attack their prey with unflinching resolution. Having seized their victim, they never let go their hold. They generally aim at the neck below the ear, where they pierce the large blood-vessels with their teeth, or they fix upon the back of the head and drive their teeth through the skull. Few quadrupeds exceed them in agility and address; they bound and spring with vigour, and climb trees with astonishing dexterity, traversing the branches with a rapid gliding motion. Of nocturnal habits, they pass the greatest part of the day in their retreats, which are in the hollows of decayed trees, in burrows, holes in walls, and similar places. With the approach of night they rouse from their slumbers, and, greedy for blood, begin their prowl. A polecat in the neighbourhood of a farmyard is a direful pest, and in one night will destroy a whole brood of poultry, for the sake of the blood and brains.

The shortness of the muzzle, the characters of the teeth, and the solidity of the skull, form a good index of the disposition of these animals. In the genus Putorius (Mustela), of which the polecat is an example, the dentition is as follows:—Incisors, $\frac{6}{6}$; canines, $\frac{1-1}{1-1}$; false molars, $\frac{2-2}{3-3}$; carnassière, $\frac{1-1}{1-1}$; small tubercular molar, $\frac{1-1}{1-1}$. In the genus Martes, Ray (Mustela, Cuvier), of which the marten is an example, the false molars are $\frac{3-3}{4-4}$. In the genus Gulo the dentition (as seen in Fig. 959) is as in the genus Martes.

In a commercial point of view the present family is by no means unimportant. From several species the most costly furs are procured, pre-eminent for beauty: we need only mention the sable (Martes Zibellina), and the ermine (Mustela erminea). The true sable is a native of the dreary regions of Siberia, where it haunts the gloomy pine-forests which stretch over immense tracts of country remote from human abodes. It is into the midst of these wilds that the sable-hunter has to penetrate in the pursuit of his game, and the chace is carried on in the winter, for it is then that the fur is the finest. Great are the hunter's perils and privations. He has to traverse plains and mountains covered with snow, and swept by the keen tempests of an arctic winter,—to spend days and nights in patient watching, and in the solitudes of the dismal forest;—he is exposed to overwhelming snow-storms, of which, in our climate, we can form but an imperfect idea. He often loses his way, his provisions fail, and he finds himself exposed to all the horrors of cold and famine. Who has not heard of the hardships of the hunter of sables in the deserts of Siberia? (See Fig. 960.)

961.—BRITISH MUSTELIDÆ.

We have arranged in our Pictorial Museum a most interesting group of British Mustelidæ, typical of the family. Of these, *a* is the Polecat (Mustela Putorius); *b*, the Stoat (Mustela erminea); *c*, the Beech-Marten (Martes fagorum); *d*, the Ferret (Mustela furo); *e*, the Weasel (Mustela vulgaris). Fig. 962 represents the Pine-Marten (Mustela abietum); Fig. 963, the Beech Marten (Mustela fagorum).

The polecat, fitchet, or foumart is very common in some parts of our island, where the farmer and the sportsman make common cause against it. Poultry, young and old ducks, geese, and turkeys fall a prey to its sanguinary disposition: it destroys all within its reach. Mr. Bell instances one case in which sixteen large turkeys were killed by a polecat during the course of one night, and another in which ten ducks were similarly destroyed, and the perpetrator of the outrage, when in the morning the door of the outhouse in which they were shut was opened, marched out licking his bloody jaws, without the slightest alarm. Many similar instances have come under our own personal knowledge. The predilection of the polecat for the brains and the blood of poultry is well known: it seldom touches the rest of the carcass; and we may here observe that rats display the same taste for the brains of birds. We could adduce many instances, within our own knowledge, in which birds kept in aviaries have been destroyed by rats, the brain of the victims being in every case eaten out of the skull.

It is generally in winter that the polecat haunts the farm yard. In summer it resorts to plantations, woods, and preserves of game, where it makes havoc among leverets, young partridges, and pheasants; nor are the nests of birds safe from its attacks, the eggs or callow brood being equally acceptable. No animal is more pernicious in the rabbit-warren. It can follow its prey through their subterranean galleries, which the fox cannot do; besides which, its love of slaughter seems insatiable. It would appear that even the tenants of the water are not safe from its attacks. Mr. Bewick, on his own testimony, affirms that in one instance eleven fine eels were discovered in the retreat of a polecat near a rivulet, to which its nocturnal visits were rendered apparent by tracks in the snow, both of its feet and of the writhing eels. In Loudon's 'Magazine' (vol. vi. p. 206) an instance is related in which the nest of a female polecat was opened containing five young ones, while in a side hole were packed forty large frogs and two toads, barely alive, each having been paralyzed by a bite through the brain. When attacked by dog or man, the polecat makes a vigorous resistance, and will defend itself to the last. The female breeds in the spring, making a nest of dry grass in her burrow. The young are from three to five in number. The adult polecat measures about one foot four or five inches in length, exclusive of the tail, which measures nearly six inches. The body is covered with a woolly undercoat, and this, with the base of the long hairs, which form an outer garment, is of a pale yellow; the extremities of the long hairs are of a deep glossy blackish-brown; the margins of the ears and part of the lips are white. Though by no means so valuable as that of the sable or marten, the fur of this animal (known generally by the name of Fitch) is imported very extensively from the North of Europe, and is abundant in the furriers' shops of our metropolis.

The Ferret is closely allied to the polecat; so closely, indeed, that many naturalists regard them as the same species, the more especially as a mixed breed between them may be procured. We do not, however, consider this opinion to be correct. The polecat is a native of temperate and northern Europe; the Ferret, of Africa, whence, as we are told by Strabo, it was imported into Spain for the purpose of destroying rabbits, with which, at one period, that country was injuriously overrun. From Spain it has spread through the rest of Europe, not as a wild, but as a domesticated animal.

From the earliest times it was used in the capture of rabbits by being turned, muzzled, into their burrows. Pliny alludes to this practice in his eighth book. The ordinary colour of the ferret is yellowish-white, but we have frequently seen specimens of a brown colour: these, indeed, were said to be of the mixed breed between the polecat and the ferret, and probably were so, as they were always larger and stouter than the white. One of the brown kind, in the possession of a relative of the writer's, was so tame as to be allowed the liberty of the house, and it slept in his chamber: a dangerous experiment, as instances have been known of their attacking persons and wounding them severely. An instance in which an infant nearly fell a sacrifice to a ferret is related by Mr. Jesse, in his 'Gleanings,' and quoted by Mr. Bell. The child had the jugular vein and the temporal artery opened, the face, neck, and arms lacerated, and the sight of one eye destroyed. The ferret is not only employed by the warrener, but also by the ratcatcher, who prefers the mixed breed.

The ferret is very sensitive of cold, and requires to be kept snug and warm, especially during winter, as it perishes if exposed to the severity of the season.

The Weasel (Mustela vulgaris) is so well known, that any description of its form and colour is useless. Small as this animal is, it has all the courage and ferocity of its race and will prey upon leverets, chickens, young pigeons, and ducklings; its favourite food, however, are mice, rats, water rats, and even moles. In the farmer's stack-yard and granary it is of the greatest utility, and well repays by valuable services the occasional abstraction of a chicken, a pigeon, or a few eggs. Of this, indeed, many farmers are well aware, and encourage it for the sake of the incessant warfare it keeps up against mice and rats, which, from their excessive numbers, often occasion a serious loss in grain, besides undermining the barns and outhouses.

The weasel climbs trees and runs up the side of a wall with facility, its movements being singularly graceful. When it attacks its prey, it fixes its teeth on the back of the head, and pierces the brain, which it then devours. It is said to prefer putrid flesh to that just killed, but this is very doubtful, and has arisen most probably from the circumstance of dead birds in a putrid state having been found in its hole or near its retreat, left by their destroyer. The weasel hunts by the scent, like a dog, and follows mice and moles with the utmost perseverance, tracking them through all their runs or winding galleries. It will even cross the water in the pursuit, if its prey be in sight, nor does swiftness avail, for onwards will the weasel travel, till its victim fails from exhaustion. The wolverene of North America (Gulo arcticus) pursues the beaver and other prey in a similar manner.

Instances are on record in which several weasels have united in attacking men, who with difficulty have prevented the fierce little animals from lacerating their throats, and certainly twelve or fifteen weasels would prove no mean adversaries.

The weasel often falls a prey to hawks, owls, and kites; but sometimes succeeds in coming off victorious. Many anecdotes are on record of weasels and stoats bringing eagles or large hawks to the ground—and Mr. Bell gives an instance, assuring us of its truth, in which a kite that had seized a weasel and mounted into the air, was observed to wheel irregularly, and at length to fall to the ground dead; the determined little animal having torn open the skin and large blood-vessels under its wing.

The weasel breeds two or three times in a year, having a litter of five at each birth. She makes her nest of dry herbage; a hole in the bank side, among brambles, or in an aged tree, is the usual place of her retreat; and when molested, she defends herself and her progeny with indomitable courage.

The Stoat (Mustela erminea) is allied very closely to the weasel, but is considerable larger, being upwards of nine inches long, excluding the tail. Its habits are precisely those of the weasel, but it preys habitually on larger game, as hares, leverets, &c., not excluding the rat and water-rat. Of the latter, indeed, it destroys great numbers, following them into their burrows. It hunts its prey by the scent. Some idea of the extent of the depredation of this animal may be conceived from the circumstance of two leverets, two leverets' heads, two young partridges, and a pheasant's egg having been found in the retreat of one. In our climate the stoat becomes partially white during the winter, but in more northern regions this change is complete, the tip of the tail alone remaining black. In this state it is called the Ermine. Large importations of ermine-fur are made from Russia, Norway, and Siberia to our country. In 1833 the importation amounted to 105,139 skins.

The Beech-Marten (Martes fagorum) and the Pine-Marten (Martes abietum) are both natives of our island: but the former, distinguished by a white breast, is said to be the most common. The pine-marten is distinguished by a yellow breast and throat. It must be confessed, however, that the specific distinction between these two animals is by no means very apparent, nor indeed is it admitted by many. We have many times seen the yellow-breasted or pine-marten in the fir-woods which clothe the sides of some of the hills in Derbyshire, and especially near Buxton. It prefers wild and unfrequented places, deep wooded glens, and the depths of forests, and is common throughout northern Europe. The Beech-marten also frequents woods, but not so exclusively as the former, and often lurks about farm houses and destroys poultry. Both are destructive to game. They take up their retreats in hollow trees or holes in rocks, and the female makes her nest of leaves and moss for her brood. The agility and gracefulness of these animals are remarkable; they climb trees with the ease of the squirrel, and traverse their branches or leap from bough to bough with admirable address and celerity. Their fur, especially that of the pine-marten, is full, deep, and soft, and of a beautiful brown, and not far inferior to that of their immediate ally the sable. The marten exceeds the polecat in size, and the tail is long and bushy. The ears are large and open, and the eyes bright and lively. In general instincts they agree with the other Mustelæ.

Distinct from both of these, we regard the American pine-marten, characterized by a shorter tail and fuller fur. Its skins are annually imported into England from North America, where it is abundant in the high latitudes. Dr. Richardson observes that in America "particular races of martens, distinguished by the fineness and dark colour of their fur, appear to inhabit certain rocky districts. The rocky, mountainous, but wooded region of the Nipogon, on the north side of Lake Superior, has been long noted for its black and valuable martens, skins." The animal is usually taken in traps baited with the head of a bird. It is very bold, and when attacked shows its teeth, hisses like a cat, and bites with great severity. "Upwards of one hundred thousand skins have been collected annually in the fur countries." Another and larger species, the Pekan, or Fisher (Martes Canadensis), is common in the northern parts of America, ranging from Pennsylvania to the Great Slave Lake, and from shore to shore across the country. Its fur is less valuable than that of the former. It gives preference to damp spots and humid forests bordering water.

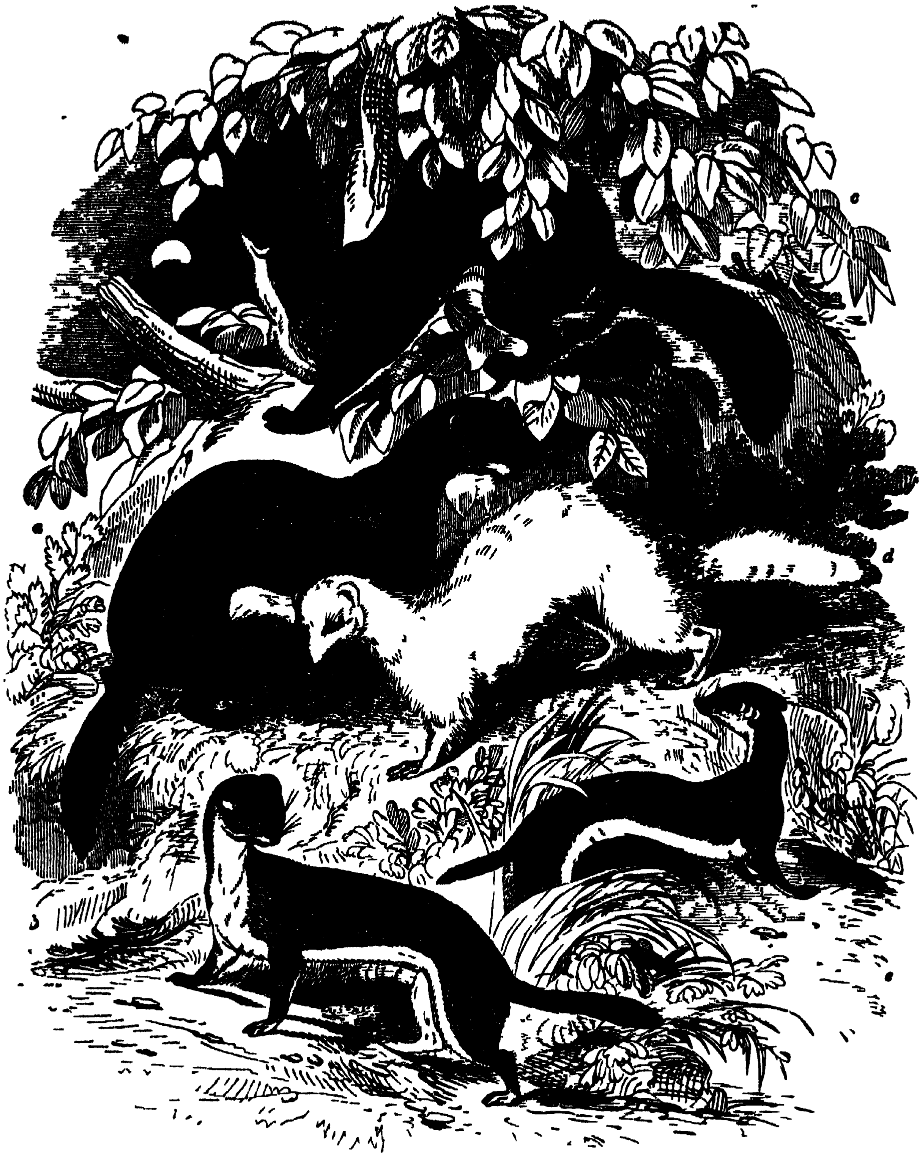
964, 965.—THE GLUTTON

(*Gulo arcticus*, Desm.). Pallas and Gmelin referred the Glutton to the genus Ursus; it belongs, however, to the present family: see its dentition (Fig. 959). Linnæus rightly regarded it as a Mustela.* In their general port and figure the gluttons are intermediate between the polecats and the badgers. They have no decided scent-pouch, but a glandular fold of the skin.

Two varieties, perhaps species, of Glutton are known: one, a native of the high northern latitudes of the Old World; the other, of the cold regions of America. The Old World species (Gulo arcticus), the Rossomak of the Russians, is of a deep chestnut passing into black on the limbs, with a brown disk on the back. The American animal (Gulo luscus, Sabine), termed Wolverene, Carcajou, and Quickhatch, is paler. The glutton is nocturnal in its habits: the limbs are strong and short; the feet subplantigrade, with five toes, armed with sharp claws; the head broad, ending in a narrow muzzle; the ears are short and rounded; the tail moderate. As we are inclined to regard the Old World and American gluttons as mere varieties, we shall not disjoin their history. The first writer who has described this animal is Olaus Magnus. "Among all animals," he says, "which are regarded as insatiably voracious, the glutton in the northern parts of Sweden has received an express appellation, being called, in the language of the country, Jerff; and in German, Vielfrass. In

---

* 'Syst. Nat.,' 12th edit. He retains, however, the term Ursus for the Wolverene, naming it Ursus luscus.

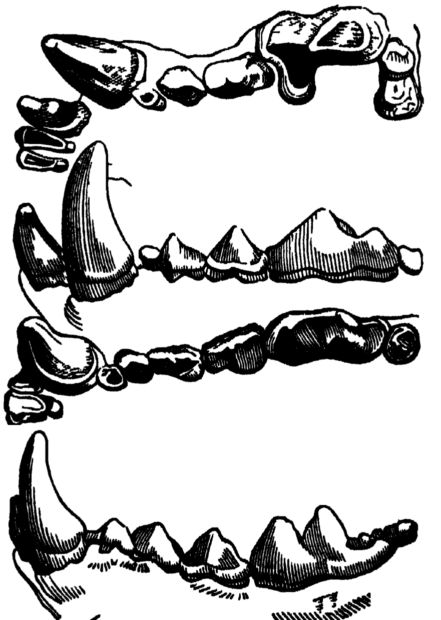


961.—British Mustelidæ (Weasels).

2.—Pine Marten.

963.—Beech Marten.

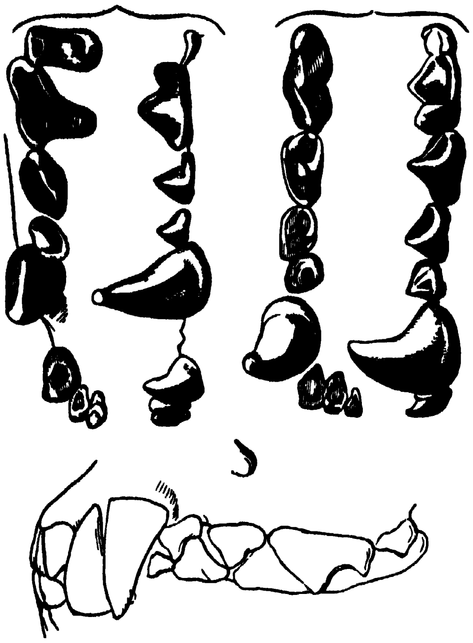
964.—Glutton.



965.—Teeth of Glutton.

966.—Grison.

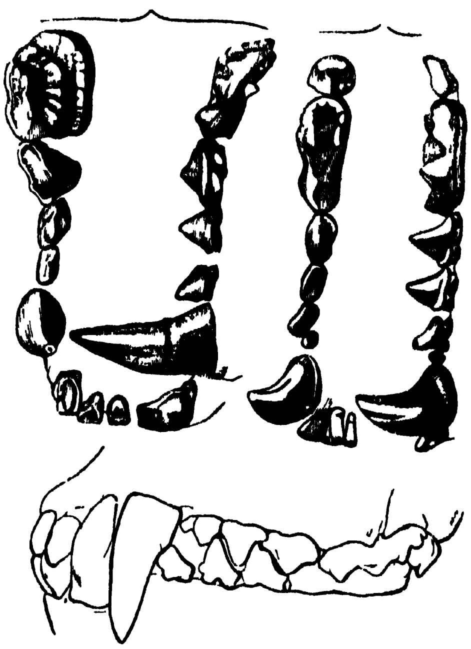
967.—Skunk.



969.—Teeth of Ratel.

974.—Indian Badger.

972.—Common Badger.



973.—Teeth of Badger.

968.—Cape Ratel.

the Slavonian language its name is Rossomaka, in allusion to its voracity; in Latin, however, it is only known by the fictitious name of Gulo, from its habits of gorging (gulo à gulositate appellatur)."—Ol. Mag., 'His. de Gent. Septent.'

The glutton is indeed a voracious animal, but by no means formidable to man or the larger beasts, though, in proportion to its size, its strength is very great. Slow in its movements, it makes up by perseverance and industry for this defect, and at a steady pace pursues its prey for miles, hunts out weak or dying animals, and destroys hares, marmots, and birds, which it seizes unawares.

Buffon, relying on the authority of Olaus Magnus, Isbrandt, and others, has contributed to render current the statement (which many later naturalists have deemed not incredible) that the glutton has recourse to the most subtle artifice in order to surprise its victims, and that it lurks in the branches of trees until the reindeer approaches to browse beneath, when it throws itself upon the unsuspecting animal with unerring rapidity, fixes its strong claws in the skin, and proceeds to tear the neck and throat till the wretched victim falls exhausted and dies, when the victor devours his prey at leisure. Gmelin, in his account of his journey through Siberia, after quoting the statement of Isbrandt, adds, "This address of the Glutton managing to seize animals by surprise is confirmed by all hunters." .... "Although it feeds on all animals, living or dead, it prefers the reindeer. It lies in wait for large animals as a robber on the highway, and it also surprises them as they lie asleep." To the circumstance of the glutton fixing on the reindeer, and also the elk, Desmarest expressly alludes, evidently relying on the narratives of the earlier writers. On the contrary, Dr. Richardson, in his able history of the American Glutton, or wolverene, affirms that no such artifice is resorted to by that variety, and he appears altogether to disbelieve the account. No doubt the details have been exaggerated, still we are not altogether to throw aside the assurances of old travellers of credit; indeed we think it very probable that the glutton may steal upon the reindeer asleep, or attack enfeebled or dying deer, or young fawns, and fixing on the great blood-vessels of the throat (as the weasel does when attacking the hare), thus destroy its victims. Gmelin, Dr. Richardson, and Mr. Graham agree in the fact that the glutton is extremely annoying to the fur-hunters, visiting their traps and devouring the animals taken in them. In Siberia it rifles the traps of the sable and corsac fox; and, as Mr. Graham observes, in Northern America it will follow "the marten-hunter's path round a line of traps extending 40, 50, or 60 miles, and render the whole unserviceable merely to come at the baits, which are generally the head of a partridge on a bit of dried venison. They are not fond of the martens themselves, but never fail of tearing them in pieces or of burying them in the snow by the side of the path at a considerable distance from the trap. Drifts of snow often conceal the repositories thus made, in which case they furnish a regale to the hungry fox, whose sagacious nostril guides him unerringly to the spot. Two or three foxes are often seen following the wolverene for this purpose." During the summer the beaver is the common prey of this animal.

The glutton is nocturnal, cunning, and determined; it fights very resolutely, and is more than a match for a single dog, its strength being very great. Its fur is in much request, especially that of the Siberian animal, which is dark and beautifully glossy. The length of the glutton, exclusive of the tail, is about two feet six inches; that of the tail, including the long full fur, ten inches. The female breeds once a year, the cubs being from two to four in number. Their fur is soft, downy, and of a pale yellowish white.

966.—The Grison

(*Galictis vittata*, Bell); Gulo vittatus, Desmarest; Viverra vittata, Linn.; Petit furet, D'Azara; Grisonia vittata, Gray; Lutra vittata, Traill; Ursus Braziliensis, Thunberg; Foume de la Guyane, Buff. 'Suppl. III.' The grison is a native of the intertropical provinces of America, Guiana, Paraguay, and Brazil. It is remarkable for its sanguinary and fierce disposition, and the disgusting odour of the secretion of its scent-glands. A specimen was living some time since in the menagerie of the Zoological Society, and its death afforded us an opportunity of investigating its internal anatomy. ('Zoological Proceedings,' 1833, p. 140.) In its figure the grison is very elongated, the head is flat, and the muzzle somewhat acute; the general colour is grizzled black; the top of the head and neck grey, with a white semi-lunar shaped band across the forehead, extending to the shoulders. Length of body one foot six inches; of tail six inches and a half. A second and larger species has been characterized by Mr. Bell, under the name of Galictis Allamandi. Linnæus applied the name of Mustela barbata to a large musteline animal inhabiting the woods of Brazil and Paraguay, which Azara denominated the Grand Furet and Pennant the Guiana Weasel. By Desmarest it is referred to the genus Gulo, and is termed Gulo Barbulus. This animal is the Taira (or Galera of Brown). Two specimens from Trinidad, differing from each other in colouring, are preserved in the Museum of the Zoological Society. (See 'Proceeds. Zool. Soc.,' 1831, p. 74.) To the musteline group belong the Zorilles of Africa: most writers seem to consider the Zorille as constituting a single species (Zorilla Capensis). We are however of opinion that the Cape species is different from that which we have seen repeatedly from the northern coast of Africa. The Senegal zorille has not come under our notice, but it is stated to differ from the Cape animal. The zorille is less than the polecat, and, like that animal, is fierce and exceedingly active. It dwells in burrows, which it digs in the ground, concealing itself during the day. The colour of the back is an irregular mixture of black and white in broken or indefinite lines. The head, sides, and under-surface are black, with the exception of a white oval spot on the forehead, and a white mark over each eye. To this genus is apparently referable a species from Madagascar, Mustela striata, Geoff.; Putorius striatus, Cuv.; Galictis striata of Isidore Geoffroy.

967.—The Skunk

(*Mephitis Americana*). Several species of these animals, called Mouffettes, Mephitic Weasels, Bêtes puantes, Enfans du Diable, &c., are natives of America. The genus is intermediate between that of the polecats and the badgers.

These animals are notorious for the intolerable odour of the secretion of their glandular pouches, which neither man nor dog can endure. The head is small, the snout pointed, the body robust and covered with long coarse hair, the tail rather long and very bushy. The general colour of the upper surface is white, interrupted by a stripe, more or less broad, of black along the spine; the limbs and under surface are black. According to Kalm, the skunk of North America "brings forth its young in the hollows of trees and in burrows; it is not confined to the ground, but climbs tree; it is an enemy to birds; it destroys their eggs and also devours their young; and when it can enter the poultry roost it makes great destruction. When it is chased either by men or dogs it runs as far as it can or climbs a tree; but when it finds itself hard pressed, it ejects its fluid against its pursuers: the odour of this is so strong as to suffocate; if a drop of this pestilential secretion falls in the eyes, it is at the risk of losing sight; and when it falls on the clothes, it communicates an odour so powerful, that it is very difficult to get rid of it; most dogs fear to attack it, and flee when touched by a drop." Mr. Graham confirms this account, and says that he knew several Indians who had lost their eyesight in consequence of inflammation produced by this fluid having been thrown into them by the animal, which has the power of ejecting it to the distance of upwards of four feet. The odour produces nausea, a sense of suffocation, and not unfrequently fainting. With all this, however, the skunk is often taken young and tamed, when the animal seldom gives out its pestilential secretion; its flesh, moreover, is very frequently eaten, and is said to be well flavoured. It appears that, when the natives kill a skunk, they remove the whole of the glandular sacs, in order that no unpleasant smell or flavour may be communicated to the flesh. In the northern latitudes the skunk passes its winter in a hole, seldom stirring abroad, and then only for a short distance. It preys on young hares, rats and mice, and has been observed to feed much on frogs. The skunk is about eighteen inches in length, exclusive of the tail, which is nearly as long as the body. Besides the common skunk (Mephitis Americana) four distinct species are in the Museum of the Zoological Society. From the genus Mephitis we pass by an easy transition to that group of the Mustelidæ which includes the Ratel, the Mydaus or Teledu, and the Badgers.

968.—Cape Ratel

(*Ratelus Capensis*, F. Cuv.); Mellivora Capensis, Storr; Viverra mellivora, and Ursus mellivorus, Blumenb.; Taxus mellivorus, Tiedem.; Meles mellivora, Thunberg; Ratel, Sparrman; Honey-weasel, Shaw. In their dentition, the ratels closely approximate to the true badgers (Meles), excepting that the last molar is smaller and narrower in proportion from its anterior to its posterior edge (see Fig. 969).

The Cape ratel is a thickset clumsy animal, with short limbs, and a partially plantigrade walk. The claws are very robust, the muzzle is elongated, the eyes are small and sunk, and the external ears nearly rudimentary; the general aspect is badger-like. The Cape ratel is a native of South Africa, and has been celebrated for the destruction it makes among the nests of the wild-bee, to the honey of which it is said to be very partial. Doubtless, however, it avails itself of other food, and probably, like the badger, devours flesh and roots. In the discovery of bees' nests it is said to be directed by the actions and voice of a bird termed the Honey-guide (Indicator Vaillantii). These insects, in South Africa, usually build their cells in the deserted excavations of the wild-boar or the porcupine, and from these the ratel digs out its plunder. It preys chiefly in the evening, remaining during the greater portion of the day in its burrow. When taken young, it is easily domesticated. The hide of the ratel is extremely tough and loose, and, according to Sparrman, if a person catches hold of it by the back part of the neck, it is able to turn round, as it were, in its skin, and bite the arm that molests it

The Cape ratel is about two feet six inches long, exclusive of the tail, which is about eight inches. The general colour above is grey, the under parts black, and a white line runs on each side from the ears to the origin of the tail, abruptly dividing these two colours.

970.—The Indian Ratel

(*Ratelus Indicus*). This species, though known to Pennant and Shaw (who termed it Ursus Indicus), has only been recently recognised as a distinct species. Lesson was not aware of the difference—nay, neither he nor Desmarest appears to have known of the existence of the Indian ratel; and General Hardwicke, who figured it in the 'Linn. Trans.,' vol. xi., makes no allusion to the Cape ratel, apparently overlooking their relationship. Mr. Bennett observes that the only difference he has been able to detect between the Asiatic and African animals consists in the absence of the white line dividing the two colours in the Indian species, and which are not so abrupt. The absence of this line we consider to have been an individual peculiarity. The Indian ratel is a native of various provinces of India, on the high banks of the Ganges and the Jumna, where it rarely comes forth from its burrow by day, but prowls at night about the houses of the natives, enters the cemeteries, and with extraordinary celerity works its way to the bodies recently interred, which it greedily devours. It feeds also upon rats, birds, &c. When taken young, the Indian ratel is easily tamed and becomes playful. It is fond of climbing, but its actions are clumsy, though it securely traverses the larger branches. Its voice is a deep hoarse guttural bark. (See 'Proceedings of the Zoological Society,' 1835, p. 113.)

The following description of a specimen from Madras, in the menagerie of the Zoological Society, is from the pen of Mr. Bennett:—"As far as its manners have yet been developed, it appears to be, with regard to man at least, one of the most playful and good tempered of beasts, soliciting the attention of almost every visitor by throwing its clumsy body into a variety of antic postures, and when noticed, tumbling head over heels with every symptom of delight. But towards animals it exhibits no such mildness of temper; and it is curious to observe the cat-like eagerness with which it watches the motions of any of the smaller among them that happened to pass before its den, and the instinctive dread manifested by the latter on perceiving it. Its food is of a mixed nature, consisting, like that of the bears and other less carnivorous beasts, of bread and milk in the morning, and flesh in the latter part of the day." ('Zoological Gardens.')

Allied to the ratels is the teledu (Mydaus meliceps), an animal confined to the mountain districts of Java, and which resembles the badger in its habits. It is well described by Dr. Horsfield in the 'Zoological Researches.'

971, 972.—The Badger

(*Meles vulgaris*). The approximation of this animal to some of the Ursidæ is evident; yet is there still an important line of demarcation. All the Ursidæ have two true molars; in the true ursine group the posterior molar is long; in the aberrant group, including Ailurus, Procyon, Nasua, and Cercoleptes, the two molars are nearly equal in size. In the badger, the ratel, &c., as in the polecats, there is but one true molar. That of the upper-jaw in the badger is very large (see Fig. 973, the teeth of the badger), and adapted for the mastication of vegetable aliment.

The badger is extensively spread through Europe and Asia; it is recluse and nocturnal in its habits, frequenting deep woods, where it makes a deep commodious burrow, for the excavation of which its short muscular limbs and powerful claws are well adapted. The burrow has only one entrance, leading into different chambers, and terminating in one of a circular form, which is comfortably lined with grass and hay. Here the animal spends the day repose, moving out only at night, in search of food. It feeds upon roots, fruits, insects, frogs, young rabbits, field-mice, &c., as well as upon the eggs and young of partridges and pheasants, &c. It is said to attack the nests of the wild-bee, plundering the store of honey, and also devouring the larvæ, without dread of the stings of the enraged insects, which cannot penetrate its thick tough skin.

The badger measures about two feet three inches in the length of the head and body, that of the tail being seven inches and a half. The head is long and pointed, the ears close, the body broad, stout and low, the hair trailing along the ground as the animal moves along. The fur is full, coarse, and deep; its general colour above is brownish grey, lighter on the sides and tail: the under parts are black, as are also the legs and feet. The head is white, with a black stripe extending from the shoulder over the ear and eye almost to the muzzle. From its colour, this animal is in some parts called the grey; its old Anglo Saxon name is Broc, a word still retained in Scotland and the adjacent counties of England. It has a glandular subcaudal pouch. The badger is by no means active or alert, and is generally observed to be very fat, as is the case with most animals that lead a tranquil, indolent life, and feed upon vegetable as well as animal diet. It is nowhere very common, especially in the more cultivated countries, where the woods are thinned, and its solitudes invaded by the axe.

The female produces from three to five young in the summer, having prepared a nest in her deep burrow for their reception They are nursed for five or six weeks, and then begin to shift for themselves. When taken at an early age, the badger may be tamed with little trouble, and soon becomes playful, and very attached to its keepers. Though harmless and indisposed to enter unnecessarily into a combat, yet it shows when assaulted great spirit and resolution, and is no mean antagonist for a dog twice its own weight to grapple with; its general muscular power is great: its skin is loose and tough, and well protected by coarse shaggy fur, and its bite is dreadfully severe; indeed the jaws are endowed with astonishing strength, and the lower one at its joint or hinge with the skull is so locked as to be inseparable, the cavity into which the condyle is fitted being modified in such a manner as to retain it permanently in its place. From its prowess and bodily qualifications the badger was formerly in much request for the brutal sport of baiting, a favourite and exciting pastime, gratifying to those who are indifferent to the pain they inflict and incapable of purer pleasures.

The skin of the badger is not without value in commerce. It makes excellent pistol-holsters, and the hair is used for painters' brushes and various other purposes. The flesh, or at least the hams of this animal are said to be palatable, and to resemble those of the bear, for which a relish has been felt or affected by sportsmen epicures. In China, the badger, as "Honest John Bell" the traveller states, may be seen in the meat markets by dozens. In America a species of badger, the Meles Labradorica, is widely spread; this species, according to some naturalists, forms the type of a distinct genus (Taxidea, Waterhouse; see 'Proceedings of the Zoological Society,' 1838, p. 153.)

974.—THE INDIAN BADGER

(*Arctonyx collaris*, F. Cuv.); Meles collaris; Balloo-soor, Hindustanee. This animal was first described and figured by Bewick, in his 'History of Quadrupeds' (from a living specimen kept in the Tower about the year 1790), under the title of Sand-Bear. Bewick at once recognised its affinity to the badger, but, ignorant of the country from which it was brought, suspected it to be the white badger of North America described by Brisson; a mistake we may readily pardon. Not aware that any English writer had described it, Duvaucel, who saw two individuals at Barrackpore, in the menagerie of the governor-general, considered the species as altogether new. Fred. Cuvier regarded it as the type of a distinct genus.

The size of the sand-hog, for such is the meaning of the term balloo-soor (not Bali-saur, as Duvaucel writes it, nor Bhalloo-soor, which signifies bear-pig), is that of a badger, but it stands higher on the legs, and its snout is elongated and truncated at the extremity like that of a hog. The ears are small, covered with hair, and surrounded by a circle of white. The muzzle is flesh-colour, and nearly naked; two black bands run on each side of the head, and unite near the muzzle; the larger of these bands on each side passes round the eye to the ear, and along the neck and shoulder, to unite with the black colour prevailing on the fore-limbs. The general colour of the body above is yellowish-white, the hairs on the back being coarse and tipped with black. The under surface is very thinly clothed, and the tail resembles that of a hog. The toes (five on each foot) are united together their whole length, and armed with large strong claws adapted for digging. Of the habits of this animal in its natural condition little is known. The individuals, a male and female, observed in the menagerie of the governor-general at Barrackpore by Duvaucel, were remarkably shy and wild. The female, however, was less savage than the male, and showed a certain degree of intelligence, which gave reason to believe that, if taken young, this animal might be easily domesticated. They passed the greater part of the day buried beneath the straw of their den in deep sleep. All their movements were remarkably slow. Though they did not altogether refuse animal food, yet they exhibited a marked predilection for bread, fruits, and other substances of a vegetable nature. When irritated, they uttered a peculiar kind of grunting noise, and bristled up the hair of their back; if still further tormented, they would raise themselves upon their hind-legs like a bear, and appeared, like that animal, to possess a power in their arms and claws not less formidable than their teeth. This is confirmed by Mr. Johnson, in his 'Sketches of Indian Field-Sports.' "Badgers in India," says he, "are marked exactly like those in England, but they are larger and taller, are exceedingly fierce, and will attack a number of dogs. I have seen dogs that would attack a hyæna or wolf afraid to encounter them. They are scarce, but occasionally to be met with among the hills."

975, 976, 977, 978.—THE OTTER

(*Lutra vulgaris*); Mustela Lutra, Linn. This, there can be little doubt, is the ἐνυδρὶς (Enhydris) of Aristotle and the Greeks, and the Lutra of the ancient Italians. It is the Lodra, Lodria, and Lontra of the modern Italians, Nutria and Lutra of the Spanish, Loutre of the French, Otter and Fisch Otter of the Germans, Otter of the Dutch; Utter of the Swedes, Odder of the Danes, Dyfrgi of the Welsh; Balgair, Cu-donn (Brown Dog), and Matadh of the Northern Celts, and Otter of the modern British.

On introducing the otter to notice, we may observe that these animals seem to conduct the Mustelidæ to the seals; though it must be confessed the dentition of the latter is modified on a different and peculiar type. The otters in fact constitute an aquatic group of the Mustela, indeed many of the true weasels resort occasionally to the water in quest of prey; the vison of North America (Mustela vison), and a near ally, the Mustela lutreola of northern Europe and Asia, for example, are aquatic and otter like in their habits, and approximate to the otter in form

The otters are distinguished by the peculiar breadth and flatness of the head, and the rounded outline of the muzzle, the lips being large and fleshy, and furnished with strong whiskers, which are evidently the communicators of feeling, the ears are very small, and close to the skull; and the eyes, of moderate size, are provided with a nictitating membrane as a defence to their surface. The tail, which in most aquatic mammalia is an important instrument, is long, but very stout and muscular at the base, somewhat compressed horizontally, and tapering gradually to the extremity In swimming and diving it is used as a rudder, enabling the animal to turn rapidly and abruptly, and assisting it to perform its varied and graceful manœuvres while in chace of its finny prey. The tongue is somewhat rough The body is elongated and flattened, and the limbs are short and stout, the toes (five on each foot) are webbed, and spreading, the soles are naked. On land the progression of the otter is plantigrade, and by no means free or rapid: hence it trusts to the water for safety, making to it when attacked or in any danger. The fur of these animals at once indicates their aquatic habits; it is close, short, and fine, consisting of a thick woolly undercoat, and an upper layer of smooth glossy hairs. In their dentition (Fig. 979) the otters differ little from the polecats, martens, and skunks, the false molars being $\frac{3-3}{3-3}$; carnassière, $\frac{1-1}{1-1}$; tuberculous, $\frac{1-1.}{1\ \ 1}$ Fig. 980 represents the skeleton of the common European Otter.

This well-known species is by no means confined to the lakes and rivers of Europe, but abounds also on many parts of the coast, and is common on the shores of Scotland and Ireland, as well as on the rocky Hebrides and Shetland Islands, where it dwells in hollows and caverns, going out to sea to fish, or entering the mouths of rivers, and making sad havoc among the salmon, on which account, in Antrim, where it hides among the basaltic masses on the east coast, a price is set upon its head. The otter is nocturnal, night being the period in which it carries on its work of slaughter; sly and recluse, it lurks by day in its deep burrow, the mouth of which is concealed among masses of stone; the luxuriant herbage of some steep bank which overhangs the water, or beneath the twisted roots of an overshadowing tree.

The movements of the otter in the water are remarkably graceful, and it swims at every depth with great velocity; every now and then it comes for a moment to the surface to breathe, previously expelling the air pent up in its lungs, which, rising in bubbles marks its subaquatic course. Having taken breath afresh, it dives noiselessly like a shot, and gives chace to its prey, which it follows through every turn and maze, till at length the exhausted victim can no longer evade the jaws of its rapacious foe. Whoever has witnessed the feeding of those which from time to time have been kept in the gardens of the Zoological Society, cannot fail to have remarked the fine sweep of the body as the animal plunges into the water, its undulating movements while exploring its prey, the swiftness and pertinacity of the pursuit, and then the easy turn to the surface with the captured booty. This is generally devoured before the chace of another fish is commenced, sometimes, however, instead of treating them thus separately, the otter contrives to bring up several at a time, managing not only to seize them, but to carry them hanging from its mouth. In eating them it commences with the head, which it crushes in an instant between its teeth. Eight or ten moderate-sized fish serve for a single meal, but it is well known that in a state of nature the otter slaughters a much larger number of fish than it devours: hence some idea may be formed of the havoc occasioned by a pair of otters in support of themselves and their young Indeed the animal seldom devours more of a fish than the head and upper portion of the body. When fish is scarce, the otter will feed on frogs and water-rats. Mr. Bell informs us that "when driven by a scanty supply of fish, it has been known to resort far inland to the neighbourhood of the farm-yard, and attack lambs, sucking pigs, and poultry, thus assuming for a time the habits of its more terrestrial congeners." In winter, when the smaller streams and ponds are frozen, the otter wanders in search of places in the river, the depth of which secures them against the effects of the frost, or travels down the smaller streams to the large river, into which they merge, and there continues its work of destruction.

It is during the spring and summer months, while the young of the otter are dependent upon the mother's care, that the destruction she makes among the fish is most considerable, she has not only her own wants, but those of her offspring to provide for, and her exertions during the silent hours of night are unremitting. The track she leaves in the mud or the soft soil on the water's edge, as she goes to and fro from her retreat, witnesses the extent of her labours, and also their success: a fish-preserve, if near her haunt, at this season suffers immensely from her depredations, and is certain to be visited night after night until none but the smaller fry remain. The mill dams of trout-streams are also favourite fishing-places of this cunning animal, and are often sadly thinned of the finest fish. Nor is the injury done by the otter confined to the mere destruction of fish for food, its presence militates against their increase, inasmuch as they are scared by their enemy from their spawning places, and prevented from depositing their spawn so as to secure the vivification of the ova, to the mortification of all "honest anglers." Izaak Walton says "an otter will sometimes go five or six or ten miles a night to catch for her young ones, or glut herself with fish,' but it also as often happens that where the otter finds a piece of water replete with prey, that it there takes up its abode, and perhaps carries on for weeks, unsuspected, its depredations. Independently, however, of the footsteps of the otter betraying its residence in the vicinity, the circumstance of its always voiding its spraint, or dung, on one spot often leads to its discovery; the undigested remains of fish, their bones and scales, denote the nature of their devourer; and the alarm of an otter in the neighbourhood is soon followed by a search for the delinquent.

Otter-hunting was among the favourite field-sports of our ancestors, and is still eagerly carried on in the islands of Scotland, where the difficulties of the chace, from the rocky, broken nature of the shore, add to the excitement. Figs 981 and 982 are spirited illustrations of an otter-hunt in the Hebrides.

The otter is intelligent, and when taken young easily tamed, and may be taught to assist the fisherman, by driving shoals to the nets, or by catching salmon. Daniel, Bewick, Shaw, and Goldsmith record instances in which the otter has been domesticated, as do also Mr. Bell and Mr. Macgillivray; the late Bishop Heber noticed in India, on one occasion, a number of otters tethered by long strings to bamboo stakes on the water's edge, and was informed that it was customary to keep them tame in consequence of their utility in driving the shoals of fish into the nets, as well as of bringing out the larger fish with their teeth.

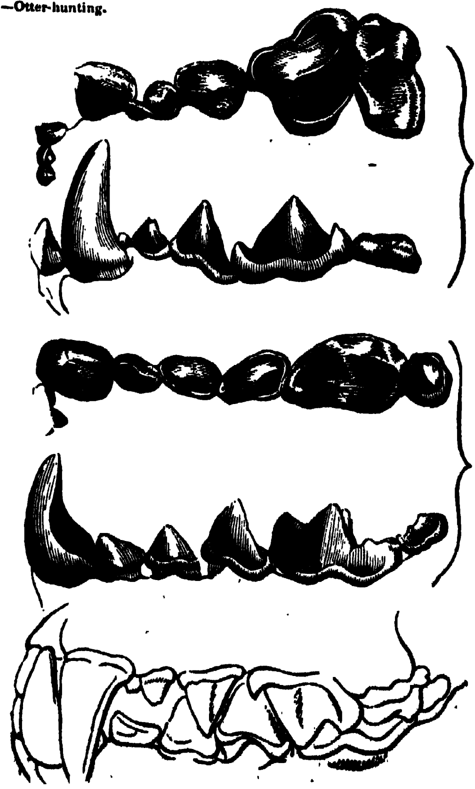
976.—Otter.

975.—Otter.

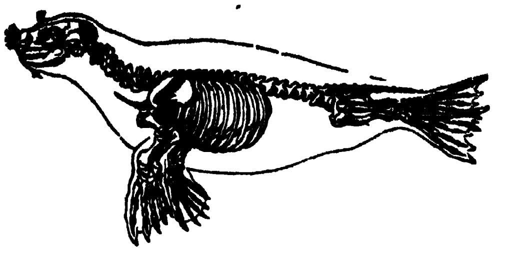
977.—Otter.

981.—Otter-hunting.

982.—Otter-hunting at a Cairn.



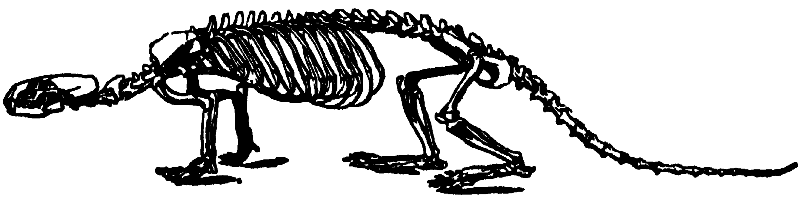
985.—Common Seal



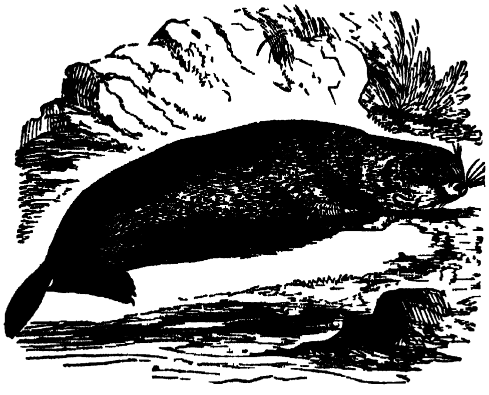
984.—Skeleton of Seal

986.—Common Seal.

993 —Harp Seal.

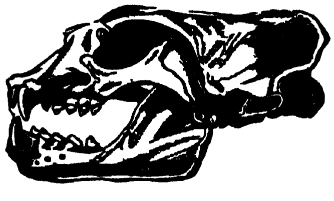


980.—Skeleton of European River Otter.

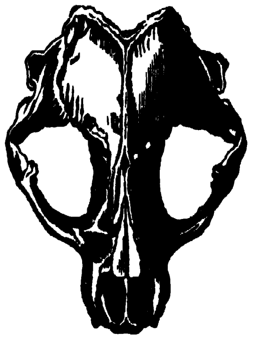


983 —Sea Otter.

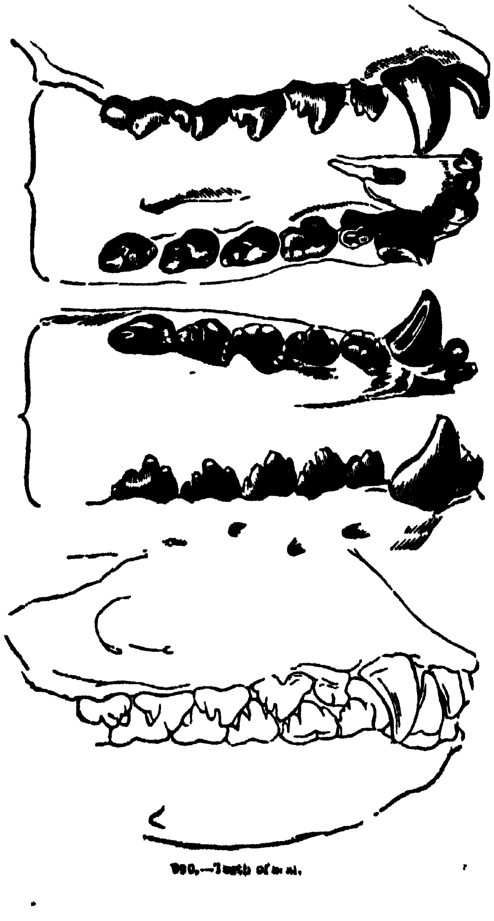
[illegible] —Seal hunting in Scotland.



989.– Skull of Seal

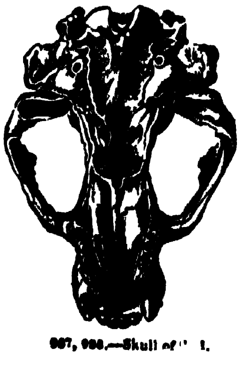


987.



990.—Teeth of seal.

994 —Immature Harp-Seal



987, 988.—Skull of Seal.

The common European otter measures about two feet two inches in the length of the head and body, the tail being one foot four inches. Its usual weight is from twenty to twenty-four pounds, but instances have been known in which it has attained the weight of forty pounds. Those that frequent the sea-coast are generally larger and darker-coloured than the otters of inland rivers or sheets of water. The female produces from three to five young, and is devoted to them, nursing them with the greatest assiduity.

A variety, spotted with white, is sometimes seen, this is regarded by the Scotch peasantry as the king of the otters, and they hold that it bears a charmed life, and is never killed without the sudden death of some man or other animal at the instant it expires itself The skin is considered as a sure preservative from infection, wounds, and dangers of the sea

983 —The Sea Otter

(*Enhydra marina*, Fleming) Lutra marina, Steller, Mustela lutris, Linn, Enydris Stelleri, Fischer, Kalan of the natives of Kamtchatka This remarkable animal in many respects approaches nearer the seals than the otters of the genus Lutra, and may be regarded as an intermediate link between the two groups We have fortunately been enabled to examine its skeleton (see ‘Zool Proceeds,’ 1836, p 59), which to the comparative anatomist presents characters of great interest The muzzle in the sea-otter is blunt and short, the ears are rounded, the body cylindrical, the fore-limbs are extremely short, the paws small and impacted in skin to the end of the toes, the sole being naked and granular The hind-legs are short, but placed as far back as possible, the thigh bone is thick with a round head, destitute, as in the seals, of the ligamentum teres, the hind foot or paddle is of great length and breadth, and the toes (five in number) are regularly graduated from the inner, which is the smallest, to the outer toe, which is the longest and stoutest. they are all united by webs to the very tip The claws are small The dentition is as follows —Incisors $\frac{6}{4}$, canines, $\frac{1-1}{1-1}$, molars $\frac{4-4}{5-5}$ Of the molars above, the first is very small and conical, the second is larger the third, or carnassiere, is large and compressed, with three rounded tubercles on its surface, the last molar is still larger, flat, with a slightly elevated and rounded edge Of the five molars below, the three first increase gradually in size, the fourth is large and flat, with three small and rounded tubercles, the last is small and flat

The tail is rather short, and when the hinder paddles are stretched out in the act of swimming, this organ will appear placed between almost as much as it is in the seals

The sea-otter is a native of the north-west coast of America, from California to latitude 60°, and of the opposite coast of Asia, from the Yellow Sea to the north of Kamtchatka and the intermediate islands Its fur, which is of a black colour, sometimes chestnut-brown, and occasionally even yellow, is soft, full, and beautiful, and is an object of commerce, being procured by the Russians for the Chinese market, where it sells for a high price

This animal haunts sea washed rocks, and lives mostly in the water, where it procures its food, which consists of fish, and, as is indicated by the characters of the teeth, which are evidently formed for bruising hard substances, shelled mollusks and crustacea In summer the sea-otter often ascends the rivers to the inland lakes The female produces on land a single cub The average length of this species is three feet, exclusive of the tail, which measures about ten inches

Family PHOCIDÆ (Seals)

Of all four limbed mammalia the seals (Phocidæ) are those which most display in every part of their organization a fitness for the watery element The body is elongated, and conical tapering from the chest to the tail (see skeleton Fig 984), the pelvis being so narrow as not to interrupt the gradual decrease The spine is provided with muscles capable of inflecting it with considerable force The clothing consists of short, stiff, glossy hairs, very closely set, and adpressed against the skin The limbs are oars or paddles. The anterior pair have the humerus and fore-arm so short, that little more than the paw alone advances from the body this in reality consists of five fingers, but they are impacted in skin, the nails, which are flat, indicating their number The hinder limbs are directed backwards, and terminate the body; the bones are short and strong, and the hip-joints want the ligamentum teres The feet are broad-webbed paddles, consisting of five toes, the central of which is the shortest, the outer one on each side the longest: when not in action the webs of these paddles are folded, and the toes in contact, but when brought into use they spread and effect a broad surface. Between these paddles is the short and compressed tail. On land or masses of ice these animals are very awkward and clumsy, but they scuttle along by the action of the anterior paddles, dragging their hinder quarters after them, and manage to proceed with tolerable rapidity, they can also climb rocks and crags of ice.

The neck in these aquatic animals is very long and singularly flexible, the head is round, with a large full fleshy muzzle, furnished with long stiff whiskers, the nostrils are valvular, and capable of being closed at will, the eyes are large and dark, with a mild intelligent expression, and are adapted for subaquatic vision The external ears are either wanting or very small, and the auditory orifice is valvular, the tongue is almost smooth, and is abrupt and indented at its tip, the brain is large, the lungs voluminous, the stomach capacious

The internal arrangement of the venous system is very remarkable, and adapted so as to effect a sort of reservoir for the blood, which naturally accumulates in it when the circulation is impeded during the suspension of breathing, as is perpetually the case, as the animals are pursuing their prey beneath the surface of the water Between the skin, which is very tough, and the muscles, there intervenes a fibrous loose elastic tissue of a dark red tint, indeed the muscles are dark, and the blood of a blacker hue than in most mammalia From the anterior part of the breastbone (sternum) a long cartilaginous continuation projects forwards for the more extensive attachment of the voluminous muscles acting upon the anterior paddles The arteries of the limbs are plexiform, as we have described them in the Lions (page 47)

The varying forms of the skull in the Phocidæ will be easily appreciated by reference to our pictorial specimens With respect to the teeth, we may describe them as prehensile, they are not formed for grinding but for seizing the slippery prey and dividing its flesh into large portions Their number is very different in the different species, nor less so are the minor details of their structure The incisors are six or four above, and four or two below, the canines are large and strong, the molars are either simply conical or furnished with cutting edges and more or less deeply notched with a large central point Without entering into any disquisition respecting the genera into which the seals are divided, and their arrangement—a point of the less importance, as our knowledge of the group is at present confessedly imperfect —we shall proceed at once to comment upon the specimens before us

985, 986 —The Common Seal

(*Phoca vitulina*) Calocephalus vitulinus, F Cuvier, Le Veau marin and Phoque commun of the French Vecchio marino of the Italians Lobo marino of the Spanish, Meerwolf and Meerhund of the Germans, Zeehund of the Dutch, Seel hund of the Danes, Sial of the Swedes, and Moelrhon of the ancient British

For the general characters of the skull, in the genus Phoca, or Calocephalus of F Cuvier, reference may be made to Fig 987, an upper view, Fig 988, an under view, and Fig 989, a profile of the Phoca Monachus Fig 990 illustrates the dentition Molars, $\frac{5-5}{5-5}$

The Phoca vitulina of Linnæus has only within the last few years been disengaged from confusion, three distinct species, according to Nilsson, having been included under that denomination, viz, Ph variegata Ph annellata, and Ph leporina To the first of these the term vitulina is really applicable, and the term variegata, given by Nilsson, must be abandoned The common seal is found along the shores of temperate Europe, and is common on many parts of the Scottish coast, and also of those of England and Ireland It is gregarious in its habits, and haunts caverns and recesses among the rocks, to which the females retire to breed The young are generally two in number, and the mother nurses them with great assiduity and affection, taking them out to sea very early When surprised basking on the shore, which the seal often does, luxuriating in the sun, its first effort is to make for the water, but if intercepted, it shows fight, and with a growl turns on its adversary, who, unless he avoid the attack, is in some danger, for the animal has great power and weight (often two hundred and twenty-four pounds) having overset its antagonist, it shuffles to the water, and there disappears All are familiar with Sir Walter Scott's humorous narrative of Hector Mac Intyre's discomfiture by a "phoca" ('The Antiquary') The voice of the seal is a gruff grunt, not unlike that of a pig, but when wounded it often utters a peculiar moaning sound. These animals are sagacious and watchful, and while half-slumbering on the beach their customary caution seldom leaves them, for one of their number is usually placed a little higher on the rock than the others, and he seems constantly awake, and ever and anon upraises his "grim feature," scenting the windward air. Flatfish, especially flounders, are the favourite food of this species, at least off the coast of Colonsay, where it is common. In the estuary of the Tees it makes great havoc among the salmon. This seal is hunted, as are others also, for the sake of its skin and blubber. The fishing commences in autumn, and is practised by means of nets stretched across narrow sounds where the seals are in the habit of swimming In these nets they are entangled, but it is only the young that can be thus captured; the old ones are shot, or their recesses and caves are entered at night by boatmen with torches and bludgeons, upon which the animals, alarmed by the glare and the shouts of the men, rush tumultuously forward to the sea, and as they push along in confusion and terror they are knocked-on the head with clubs, the men being duly stationed for the purpose

The common seal can remain under water for about five minutes, and swims so rapidly that, if alarmed, it will proceed nearly half a mile during that period The seal is intelligent and docile, and easily domesticated, it becomes attached like a dog to its master, and may be readily taught to assist in fishing Many anecdotes respecting tame seals are recorded Few animals have a finer sense of hearing, and musical sounds appear to afford it great delight Laing, in his account of a voyage to Spitzbergen, states that the violin, when played on board the vessel, would generally draw around it a numerous audience of seals, which would continue to follow it for miles Sir Walter Scott alludes to the same curious fact in the following lines —

> ‘Rude Heiskar's seals through surges dark
> Will long pursue the minstrel's bark

The common seal is from four to five feet in length, its colour is yellowish grey, more or less dappled and spotted with dusky brown

Figs 991 and 992 represent seal-hunting in Scotland, but the seal figured is not the common seal; it is a much larger and fiercer species, viz, the grey seal, Halichærus Gryphus (Phoca Gryphus, Fabricius), which is also common round the Farn Islands (See Mr Selby's observations in ‘Ann and Mag Hist. Nat,’ February, 1841, p 462) This species has till lately been confounded with another, viz the Phoca barbata, which is rarely if ever seen on our coasts

The grey seal is of great size, sometimes attaining the length of twelve feet, and producing upwards of twenty gallons of oil. It swims and dives with wonderful rapidity, but from its curiosity often comes within range of the rifle, for as the boats approach it while reposing on the rocks, or swimming on the water, it raises its head and remains for many minutes gazing at the objects of its attention. The grey seal has but little intelligence, and cannot be tamed The young, which are produced in August, grow rapidly, and are able to follow their dams to the water within a fortnight after birth.

Mr Newman, in his interesting ‘Notes on Irish Natural History’ (‘Mag Nat Hist,’ December, 1839, p 575), observes that "these seals are most abundant all round the coast of Cunnemara, from Galway to the Killery, indeed, I imagine, on every part of the coast of Ireland they are strong, resolute, and ferocious animals, and totally different from the Phoca vitulina, which is in these respects the reverse The Halichærus Gryphus grows occasionally to an enormous size, sometimes attaining even the length of twelve feet, and Mr. Ball of Dublin told me of one he had killed at Howth Harbour, which he believed to weigh five hundred pounds Phoca vitulina occurs not unfrequently on the north coast of Ireland, and among the Scotch islands, but it appears to be nearly expelled from the southern half of Ireland by the more powerful and savage species above referred to' Mr. Selby records one killed in the Farn Islands, weighing upwards of forty-seven stone, fourteen pounds to the stone

The Grey Seal is stated by Nilsson to be solitary in the Baltic, but such is not the case either on the Farn Islands or the coast of Ireland, where it tenants caves and rocks, in parties of twelve or fourteen, or perhaps more No doubt, like the Common Seal, it is often seen alone.

993.—The Harp Seal

(*Phoca Grœnlandica*). The native regions of this seal are the shores of Greenland, Newfoundland, Iceland, Kamtchatka, &c. It is one of the species in the chace of which the Greenlander encounters so many perils. Crantz, in his history of Greenland, states, that it is there called Attarsoak "It has a pointed head and big body, and is, when full-grown, nearly three yards long; it is then almost all of a white grey colour, and has a black figure on its back like two half-moons, with their horns in a uniform direction towards one ano-

other. But there are others somewhat blackish all over. All seals vary annually in colour till they are full-grown, but no sort so much as this, and the Greenlanders vary its name according to its age. In the first year it is called Attarak, and is of a cream colour: in the second year, Atteisiak: it is then grey: in the third year, Aglektok; it is then painted: in the fourth year it is Milektok; spotted: in the fifth year, Attaisoak; it then wears its half-moon, the signal of maturity."

It is singular that the Greenland Seal, in its immature livery, occasionally visits the British shores and also the coasts of France. In the 'Proceedings of the British Institution' for 1836, there is an account of two caught in the Severn; one captured on the coast of France lived for some time in the Jardin des Plantes at Paris. Fred. Cuvier, considering it a new species, gave it the title of Calocephalus (Phoca) discolor. Professor Nilsson also regarded the immature as a distinct species, and characterized it as such under the name of Phoca annellata. The titles, therefore, discolor and annellata, must both merge into Grœnlandica.

Fig. 994 is the immature Harp-Seal, the Phoca discolor of F. Cuvier, from a specimen which was captured on the coast of France, and lived for several weeks in the Paris Menagerie. M. F. Cuvier declares that he never knew any wild animal that was more easily tamed or attached itself more strongly. When it first came to the Jardin des Plantes, it did its best to escape when M. F. Cuvier tried to touch it; but in a very few days its timidity vanished, and it rather courted his caresses than shunned them. In the same enclosure with it were two little dogs, and they amused themselves by mounting on the seal's back, barking, and even biting it: the seal, however, took it in good part, and seemed pleased with them, though it would sometimes give them slight blows with its paws, as if more to encourage their play than repress their liberties. When the little dogs made their way out of the enclosure, the seal tried to follow them, not deterred by the rough and stony ground. In cold weather they all three huddled kindly and warmly together. If the dogs snatched the fish from the seal's mouth when he was feeding, he bore it patiently; but he exhibited very different conduct to another seal, who shared his mess, for they generally had a fight over their meal, the combat ending, as usual, in the defeat of the weakest.

995.—THE SEA-LEOPARD

(*Stenorhynchus leopardinus*), St. Weddellii, Lesson; Phoca leopardina, Jameson. The genus Stenorhynchus is characterized by the prominence of the muzzle and the jagged form of the teeth, which have each a bold acute middle tubercle, and an anterior and posterior acute tubercle of smaller size, separated from the middle one by a deep notch. Claws very small.

Dental formula:—Incisors, $\frac{4}{4}$; canines, $\frac{1-1}{1-1}$, molars, $\frac{5-5}{5-5}=32$ (See Fig. 996.) Fig. 997 represents the skull of a species of Stenorhynchus.

Of the habits of the Sea-Leopard little is ascertained. It inhabits the South Shetlands (south of Terra del Fuego), in 60° 37′ S. lat., and attains to the length of eleven feet. The hair is soft and thin, greyish above, yellowish on the under parts: the whole of the upper surface is spotted with whitish. The claws are sharp, black, curved, and grooved.

998.—THE CRESTED SEAL

(*Stemmatopus cristatus*). In the genus Stemmatopus the head is surmounted by a curious hood-like appendage, the nature of which is not well understood. Molars with simple roots, short, wide, and striated only on the crown; muzzle narrow, and obtuse. Dentition:—Incisors, $\frac{4}{2}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{5-5}{5-5}=30$. (See Fig. 999.) Fig. 1000 represents the skull.

The crested seal is a native of Greenland and various parts of the coast of North America. Crantz says it is called Neitseisoak by the Greenlanders, and also Clapmutz, from the "thick folded skin on its forehead, which it can draw down over its eyes like a cap to defend them against the storms, waves, stones, and sand." The apparatus consists of a cartilaginous crest which arises from the muzzle and increases rapidly in height as it passes backwards, being about seven inches high at its posterior edge, which is separated into two planes by an intervening depression an inch deep: this cartilaginous appendage is a development of the septum of the nose, and it runs into the hood or sac-like appendage of the head, which is strongly muscular, with circular fibres round its two orifices at the snout like nostrils, the true nostrils opening on each side of the cartilaginous crest beneath the hood, and are of an oblong figure. In the females and young the curious apparatus is undeveloped, being peculiar to the adult male. The eyes, which are capable of being drawn deeply into the socket during repose, are eminently formed for discerning distant objects. The fur is soft, long, and woolly beneath; in old individuals it is black, silvered on the under parts. In young animals it is grey, spotted irregularly with brown. The dilatable sac which crowns the head is covered with short brown hair.

The crested seal attains to the length of eight feet. It haunts the open sea, and is said to visit the land chiefly in April, May, and June. These animals are commonly seen on large ice islands, where they sleep without precaution. Great numbers are found in Davis's Straits, where they are stated to make two voyages a year—in September and March. They depart to bring forth their young, and return in June very lean and exhausted. In July they proceed again to the north, where they appear to procure plenty of food, for they return in high condition in September. One male is lord of many females. They fight among themselves very desperately, inflicting deep wounds with the claws and teeth. Their bite is indeed very formidable. The voice of this seal is stated to resemble the bark and whine of a dog. Great numbers of the skins of this animal are brought to England, and it is one of those seals which are so valuable to the Greenlanders.

It is the Phoca cristata of Gmelin, the Phoca leonina of Fabricius.

1001, 1002.—THE ELEPHANT-SEAL

(*Macrorhinus proboscideus*), Bottle-Nose of Pennant, Phoque à trompe of Peron, Miouroung of the Australians. In the genus Macrorhinus the males have the power of lengthening their large moveable snout into a proboscis resembling that of the tapir, through which, when excited, they respire violently. The teeth consist of four incisors above and two below, formed like the canines; the canines themselves are very large, conical, and recurved; the molars are $\frac{5-5}{5-5}$, with simple roots far exceeding in circumference the crowns, which are mere mammillary projections (see Fig. 1003).

Fig. 1004 represents the skull of Macrorhinus.

The whiskers are strong, coarse, long, and screw-twisted; the eyes are large and prominent, the paddles well developed, the nails small; hair short and close; its colour greyish or bluish grey, rarely blackish brown. Length from twenty to thirty feet, girth from fifteen to eighteen feet. In the female there is no proboscis; the colour is dark olive-brown above, passing into yellowish bay on the under parts. The hair lies in patches in all directions, giving a spotted appearance to the body somewhat like watered-silk. No nails on the hind-toes.

The elephant-seal is a native of the southern hemisphere, both in the Atlantic, Pacific, and Southern oceans between 35° and 55° S. lat., Kerguelen's Land, South Georgia, Juan Fernandez, South Shetland, and the Falklands. This huge seal lives in troops, which at certain seasons frequent various islands in the southern seas, especially where fresh-water lakes or swamps, in which they delight to wallow, are easily accessible. They are in fact migratory animals, advancing with the winter season towards the tropic of Capricorn, and towards the south in the summer. It is in the middle of June that they perform their first migration, covering, in countless multitudes, the shores of King Island, which, as the sailors report, are sometimes blackened by them. Here the females produce their young, and, as it is affirmed, the males form a line between the females and the sea, while the latter are nursing their cubs, in order to prevent the possibility of their deserting their charge, even for the shortest space of time. The period of nursing and imprisonment lasts for seven or eight weeks, during which time the females are debarred from food, and become extremely emaciated; some, it is said, occasionally perish. The growth of the young is very rapid. After birth they measure between four and five feet, but in eight days are double their original dimensions, and in the third year are from eighteen to twenty-five feet in length. At this period the proboscis begins to be developed in the male. When the term of imprisonment has expired, the whole troop, young and all, visit the sea, where the females soon recover their strength and condition, and where they sojourn for about a month, when they again visit the shore, which now becomes the arena of most furious conflicts between the adult males, the females remaining passive spectators. **When these scenes of bloodshed and excitement have ended, the troop, under the guidance of a leader, leave the shores of the islands in lat. 33°, and migrate southwards towards the antarctic circle, where they spend the summer months. It is observed, however, that a few remain in the former localities, even during the summer, probably in consequence of being disabled by wounds or debility from undertaking the ordinary journey. As soon as the frost commences in the low southern latitudes, the herds begin their return towards the tropic, and in June have arrived at their accustomed breeding places.**

Captain Carmichael, in his description of the island of Tristan d'Acunha (see 'Linn. Trans.,' vol. xii.), observes that a full grown male will yield seventy gallons of oil; indeed, as they crawl along, their body trembles like a great bag of jelly. "These seals pass the greater part of their time on shore: they may be seen in hundreds lying asleep along the sandy beach, or among the long grass which borders the sea-shore. These huge animals are so little apprehensive of danger, that they must be kicked or pelted with stones before they make any effort to move out of one's way. When roused from their slumber, they raise the fore-part of their body, open wide their mouth, and display a formidable set of tusks, but never attempt to bite. Should this, however, fail to intimidate their disturbers, they set themselves at length in motion, and make for the water, but with such deliberation, that on an excursion we once made to the opposite side of the island, two of our party were tempted to get upon the back of one of them, and rode him fairly into the water." These animals taken young are easily tamed, and become very affectionate; one petted by an English seaman became so attached to his master from kind treatment for a few months, that it would come at his call, allow him to mount upon its back, and put his hands into its mouth.

The voice of the male is deep, hoarse, and terrific, and may be heard at a great distance; that of the females and young is a kind of loud bellowing.

The food of the elephant-seal appears in great part to consist of cuttle-fish and seaweed, the beaks of the former and remains of the latter, often mixed with pebbles, being commonly found in the stomach.

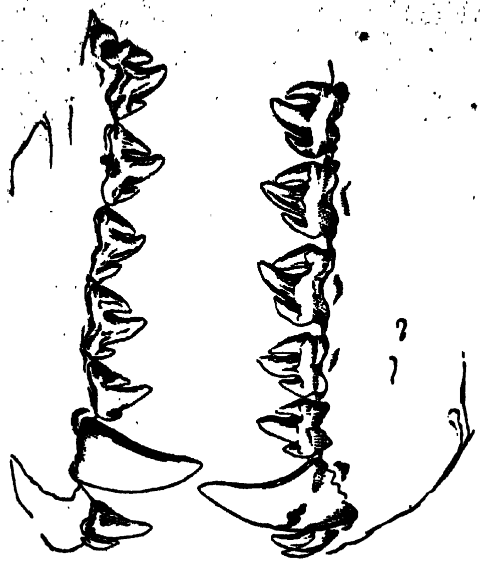
It is for the oil of this species principally, which, besides being yielded in great abundance, is clear and inodorous, that the seal fisheries of the South Pacific are conducted. The skin, moreover, is valuable, from its strength and thickness, and is extensively used for carriage and horse harness. The flesh is oily and disgusting, but the tongues, when salted, are said to be very excellent.

1005.—THE URSINE SEAL

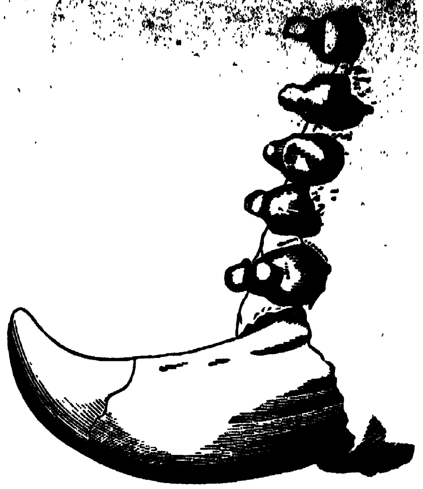
(*Arctocephalus ursinus*), Phoca ursina, Linn.; Ursus marinus, Steller; L'Ours marin of Buffon. The characters of the genus Arctocephalus are as follows:—Head with a narrow retracted muzzle: the dentition thus:—Incisors, $\frac{6}{4}$, canines, $\frac{1-1}{1-1}$, molars, $\frac{6-6}{5-5}=36$ (see Fig. 1006); small external ears. Fig. 1007 represents the skull of Arctocephalus.

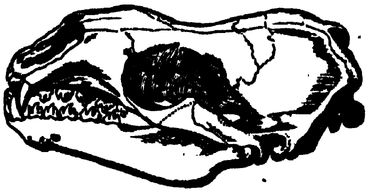
The ursine seal attains the length of nearly eight feet; its fur is brown, washed with grey; it is long and erect, especially around the neck in old males, where the hair is two inches in length and stiff; there is beneath the hair a soft brownish-red wool close to the skin. This species inhabits the islands on the north west of America, Kamtchatka, the Kurile Islands, &c., and is migratory in its habits. When these seals appear off Kamtchatka and the Kuriles early in the spring, they are in high condition, and the females are pregnant. They remain on or about the shore for two months, during which the females bring forth. They are polygamous, and live in families, every male being surrounded by a crowd of females (from fifty to eighty), whom he guards with the greatest jealousy. These families, each including the young, amounting to 100 or 120, live separate, though they crowd the shore, and that to such an extent on the islands off the north-west point of America, that it is said they oblige the traveller to quit it and scale the neighbouring rocks. Both male and female are very affectionate to their young, and fierce in their defence; but the males are often tyrannically cruel to the females, which are very submissive. If one family encroaches on the station of another, a general fight is the consequence. They will not, in fact they dare not, leave their stations, for if they did they must encroach on that of some other family. Steller relates that he had been beset by these seals for six hours together, and was at last obliged to climb a precipice to get rid of the infuriated animals, at the imminent peril of his life. They have their war-notes and several other intonations. When amusing themselves on the shore, they low like a cow, chirp like a cricket after a victory, and, when they are wounded, cry like a whelp. They swim very swiftly, and are as great a terror to other seals as the sea-lion (Phoca jubata, Gmel.) is to them.

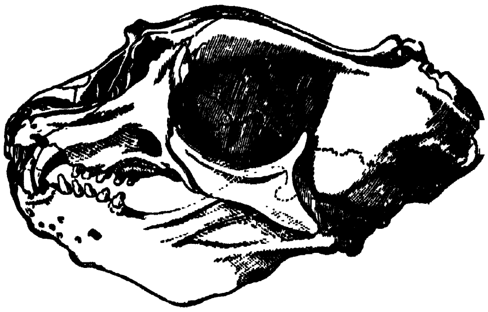
The skin of the ursine seal is very thick, and from its full deep fur makes excellent winter clothing


996.—Teeth of Sea-Leopard

995.—Sea-Leopard.

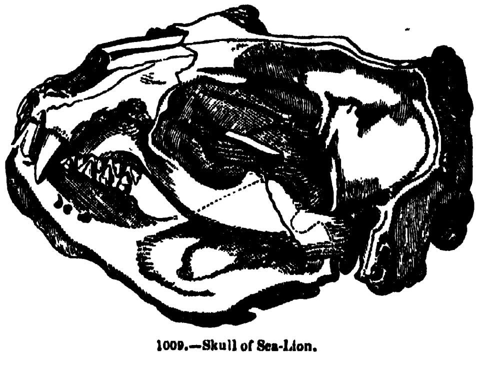

1003.—Teeth of Elephant Seal.

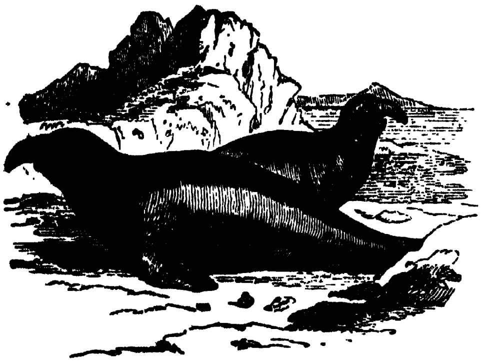

997.—Skull of Sea-Leopard.

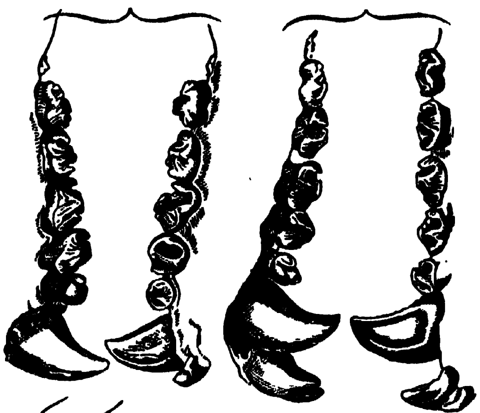

1004.—Skull of Elephant Seal.

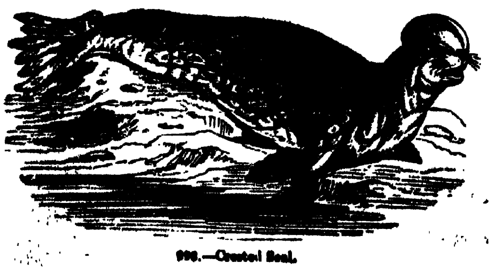
992.—Seal-hunting in Scotland.

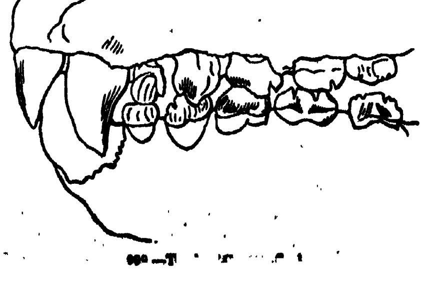
1005.—Undine Seal.

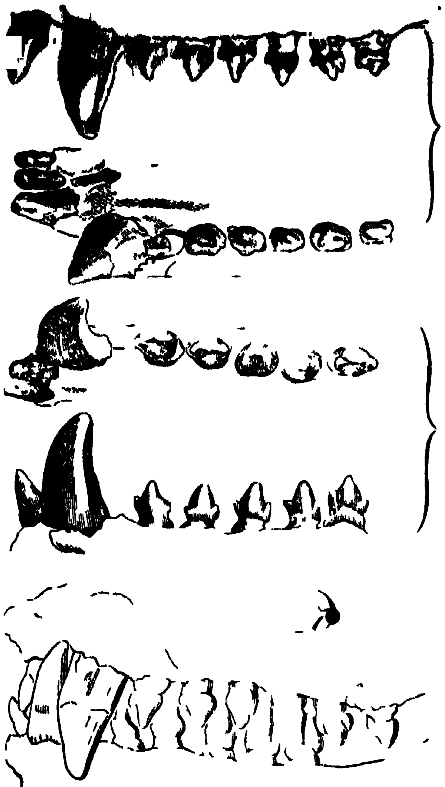

1009.—Skull of Sea-Lion.


1001.—Elephant-Seals. Males.

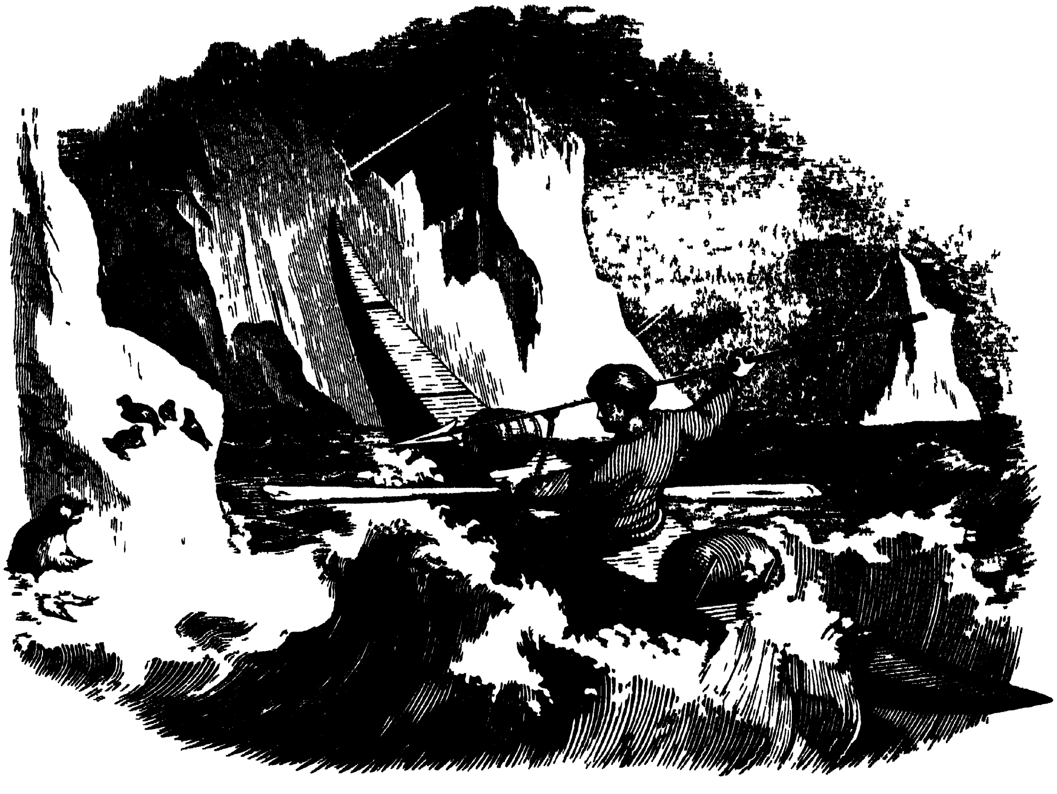



998.—Crested Seal.

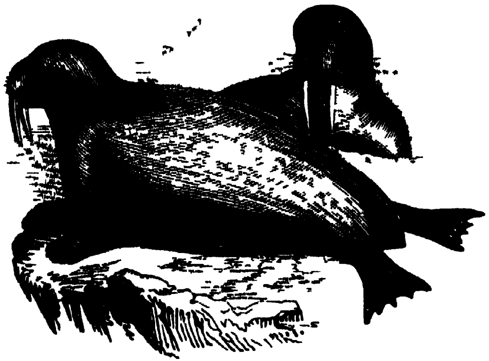

99[illegible].—T[illegible]



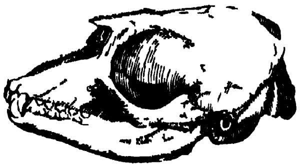
1006 Teeth of Ursine Seal



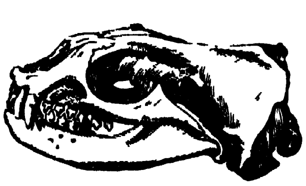
1014 —Greenlander in his Kaiak hunting Seals



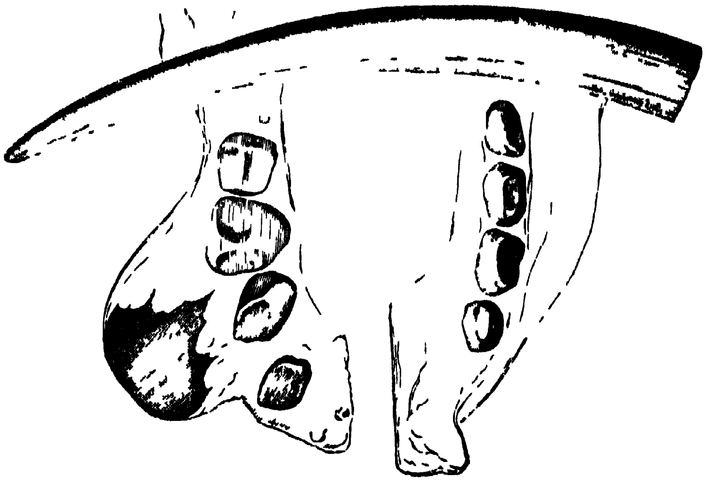
1010 —Walrus, or Morse



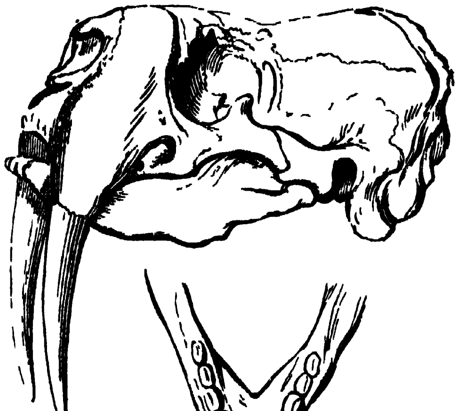
1009 —Skull of Crested Seal



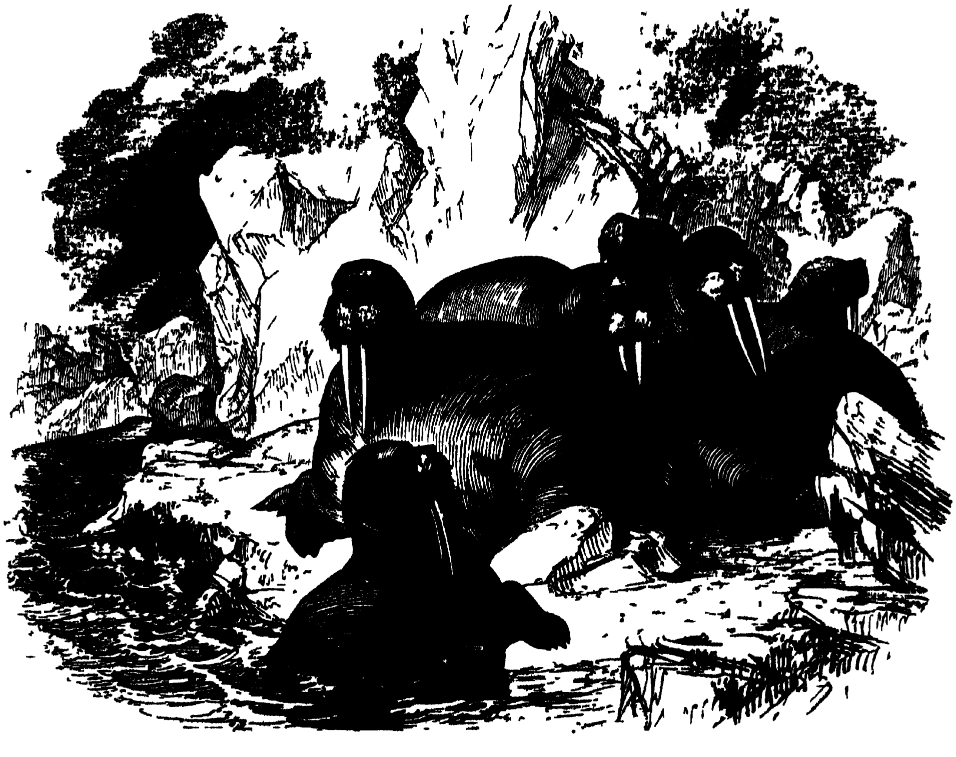
1007 —Skull of Ursine Seal.



1013 —Molars and Tusks of Walrus



1012 —Skull and Lower Jaw of Walrus



Steller speaks of a garment which he made for himself from one, when he was in Behring's Island, with grateful remembrance.

1008.—Forster's Sea-Lion

(*Platyrhynchus Fosteri*). Otaria Fosteri, Less., in 'Dict. Class.;' Phoca Forsteri, Fischer. The genus Platyrhynchus differs little from Arctocephalus, except in a few minor points in the dentition; in the greater elevation of the cerebral region of the skull, and in the enlargement of the muzzle. There are external ears. Fig. 1009 represents the skull.

Several species of seal have been termed sea-bears or ursine seals; and several sea-lions, among which may be mentioned the huge elephant-seal already described. Dr. Hamilton considers, however, that three distinct members of the present genus have been thus designated:—1, the sea-lion of Steller (Phoca jubata, Gmelin), inhabiting the eastern shores of Kamtchatka and the Kurile Islands; 2, the sea-lion of Forster (Leo marinus, Buff.), a native of the southern hemisphere; and 3, the sea-lion of Pernetty (Platyrhynchus leoninus, F. Cuvier), a native of the Falkland Islands.

Forster's sea-lion is a native of the southern seas, frequenting the Magellanic coast, Terra del Fuego, and the Magellanic Islands. The skin is thick, the hair reddish, yellowish, or dark brown; no fur or short wool under the long hair. A mane on the neck of the male reaches to the shoulders. Head small in proportion to the body, which is everywhere equally thick-looking, as Buffon describes it, like a great cylinder, more suited for rolling than walking. Ears conical, about six or seven lines long; cartilage firm and stiff, but yet rather curled at the margin. Upper lip overhanging the lower, both furnished with long, coarse, black whiskers, which become white with age. Length from ten to fourteen feet; the females shorter and more slender.

Captain Cook states that it is not at all perilous to go among these animals, for they either fled or stood still. The only danger was in going between them and the sea; for if they took fright at anything, they would come down in such numbers, that the person in the way would be run over. When he and his party came suddenly upon them, or waked them out of their sleep, they would raise up their heads, snort and snarl, and look fierce, as if they meant to devour the intruder; but when the men advanced, the sea-lions always ran away. He states that the male is surrounded by from twenty to thirty females, and that he is very attentive to keep them all to himself, beating off every male that attempts to come to his flock. Others, again, had a less number, some no more than one or two; and here and there was seen one lying growling in a retired place, suffering neither males nor females to come near him. These he judged to be old and superannuated.

Forster relates that the rocks along the shore in New Year's Harbour were covered with multitudes of these sea-lions. "We put into a little cove under the shelter of some rocks," says he, "and fired at some of these fierce animals, most of which immediately threw themselves into the sea. Some of the most unwieldy however kept their ground, and were killed by our bullets. The noise which all the animals of this kind made was various, and sometimes stunned our ears. The old males snort and roar like mad bulls or lions, the females bleat exactly like calves, and the young cubs like lambs. They live together in numerous herds. The oldest and fattest males lie apart, each having chosen a large rock to which none of the rest dare approach without engaging in furious combat." Forster goes on to relate that they were often seen to seize each other with an indescribable degree of rage, and that many of them had deep gashes on their backs, which they had received in the wars. The younger active sea-lions, with all the females and the cubs, lay together. They commonly awaited the approach of the people; but as soon as some of the herd were killed, the rest precipitately fled, some females carrying off a cub in their mouths, while many were so terrified that they left the young behind. When undisturbed, they were often observed caressing each other in the most tender manner, and their snouts often met together as if they were kissing. The same author states that they come on shore on those uninhabited spots to breed, and that they do not feed during their stay on land, which sometimes lasts for several weeks; they then grow lean, and swallow a considerable quantity of stones to distend the stomach. He adds that the stomachs of many of them were found entirely empty, and those of others were filled with ten or twelve round heavy stones, each of the size of two fists.

1010, 1011.—The Walrus, or Morse

(*Trichecus Rosmarus*). Leaving the genuine seals, we come to the genus Trichecus, of which we are acquainted with only one species, the Walrus or Morse, and Sea-cow of the British; Morse, Vache Marine, Cheval Marin, and Bête à la grande dent of the French. It is the Horse-whale or Whale-horse (Hval-ros) of Octher the Norwegian, who, about the year 890, made his report of it to Alfred, as having in its teeth bones of great price and excellency, some of which he brought to the king on his return from his voyage beyond Norway; also Rosmar of the Norwegians; Morss or Morsh of the Russians, and Morsk of the Laplanders.

The walrus is a native of the polar regions of both hemispheres, and it is more than probable that the arctic animal is specifically distinct from the antarctic, though in habits and manners they agree precisely. The arctic walrus has occasionally visited the British shores, and is therefore figured by Mr. Bell in his 'History of British Quadrupeds,' though it can scarcely be accounted one of their number. In general form, no less than in habits, the walrus closely resembles the larger species of seals, but it differs from all the species of this group in the general contour of the skull and in the dental formula. Fig. 1012 represents the skull and lower jaw; Fig. 1013 the molars and a tusk of this animal.

The first peculiarity which strikes us in the skull of the walrus consists in the enormous magnitude of the canine teeth of the upper-jaw, which are from eighteen inches to two feet in length, stout and solid, with large roots imbedded in protuberant alveoli, or sockets, occupying the anterior part of the muzzle, and rising above the cranium, which appears of disproportionate volume. The immense development of the alveoli of these canines, gives a swollen appearance to the face, which is increased by the tumid character of the lips, covered with thick wiry moustaches. The dentition is as follows:—Upper-jaw, incisors four, of which the two middle are deciduary, falling out at an early period; the two lateral have the character of molars. Of the enormous canines we have already spoken. Molars on each side four, cylindrical, short, and obliquely truncate; lower jaw, incisors wanting, canines wanting; molars as in the upper jaw. The lower jaw is not only small in proportion to the general volume of the skull, but is compressed as it proceeds, in order to fit in between the huge canines of the upper jaw, which sweep with a gentle curve perpendicularly downward. The nostrils, in consequence of the development of those imbedded in the maxillary bones, are thrown upwards, so as to open considerably above the muzzle with a vertical aspect. The eyes are small, but brilliant; the orifices of the ears are placed very far backwards on the head; the neck is short and thick, the chest of great volume; the tail short; the body thinly clothed with short stiff brownish hair; the hinder paddles are large. In length the walrus attains to fifteen or sixteen feet, and its body not only yields abundance of oil, but its skin is highly valued for its toughness and durability. The tusks of this animal, which remind us of those of the elephant, are instruments both of defence and of progression; by their aid it assists itself in clambering up floating icebergs, or in traversing the fields of ice along the shore, to which it resorts both to rest and breed. It uses them also with great effect in defending itself from the attacks of the polar bear, which may be regarded as its most formidable adversary, and with which it often engages in bloody conflicts. But there is also another use to which these tusks are destined: the walrus feeds to a great extent on a species of marine vegetable, the fucus digitatus, and these instruments are admirably calculated for tearing up the long wreaths of sea-weed fast rooted in the bed of the ocean. Besides this vegetable, they also feed upon other aliment; Mr. Scoresby found in their stomachs shrimps, a kind of crayfish, and the remains of young seals. They are probably omnivorous.

The Walrus, like the seal, is gregarious in its habits, and is often observed in vast flocks reposing upon the ice, or upon rocky islands or sand-banks; on these occasions some appear to act as sentinels, and give notice of the approach of an enemy; their voice is a loud roar or bray, and may be heard at a considerable distance: Captain Cook observes that in the night or in foggy weather, the roaring of the walruses gave notice of the vicinity of the ice before it could be seen. When attacked or fired at, the whole troop rushes tumultuously into the sea; should one be wounded, its companions hasten with loud cries to the rescue, and, emboldened by their numbers, assail the boat with great ferocity, and endeavour to upset or break it with their powerful tusks. The thickness and toughness of the skin render it no easy matter to drive a lance or harpoon into the animal's body, and a sharp weapon not unfrequently glances off without piercing. When wounded on shore, the morse turns furiously upon its adversary, striking right and left with its tusks, and endeavouring to dash him to the ground; then roaring with pain and fury it makes off into the sea, where it is joined by its companions. Zorgdrager, in his description of the Greenland fishery (1750), states that before the morse had been so persecuted, large troops would often advance on the shore to a considerable distance from the edge of the water, so that it was easy to cut off their retreat, and the more so as the animals exhibited no alarm on seeing the approach of the hunters, who would often kill several before the rest attempted to regain the sea. As is the case with the whale, the annual slaughter made among these animals for the sake of their oil, and of their tusks, which are of the finest ivory, has thinned their numbers, or driven them from haunts where they formerly abounded, to seek shelter in more inaccessible localities. That they are not without courage or sympathy for their wounded companions there is ample testimony. When Martens wounded one, others speedily surrounded the boat, and whilst some endeavoured to pierce it with their tusks, others raised themselves out of the water and endeavoured to board her. Captain Phipps, afterwards Lord Mulgrave, relates that when near a low flat island opposite Waygat's Straits in 1773, two of the officers went in a boat in pursuit of sea-horses. They fired at one and wounded it. The animal was alone when it was wounded, but diving into the sea, it brought back a number of others. They made a united attack upon the boat, wrested an oar from one of the men, and were with difficulty prevented from staving or oversetting her; but a boat from the Carcass joining that from the Racehorse, they dispersed. Captain Phipps adds that one of that ship's boats had before been attacked in the same manner off Moffen Island. Sir Edward Parry encountered about two hundred in Foxe's Channel, lying piled as usual over each other on the loose drift-ice. A boat's crew from both the Fury and Hecla went to attack them, but they made a desperate resistance, some with their cubs mounted on their backs, and one of them tore the planks of a boat in two or three places. Their parental affection is great. Captain Cook states that on the approach of the boats, which were hoisted out to attack them in Behring's Straits, all the Walruses took their cubs under their fins, and endeavoured to escape with them from the ice into the sea. Several whose young were killed and wounded, and were left floating on the surface, rose again and carried them down, sometimes just as the people were going to take them into the boat: and they might be traced bearing them to a great distance through the water, which was coloured with their blood. They were afterwards observed bringing them up at times above the surface, as if for air, and again diving under it with a dreadful bellowing. The female in particular, whose young had been destroyed and taken into the boat, became so enraged that she attacked the cutter, and struck her tusks through the bottom of it.

In the arctic regions the flesh of the walrus is held by the natives in great estimation; Sir Edward Parry remarks that the flesh was tolerably good, affording variety amid the ordinary sea fare. The ivory is finer than that of the elephant; the skin makes excellent carriage-harness; and the oil is valuable, though only from twenty to thirty gallons are yielded by a single carcass; its blubber, as Crantz says, being white and solid like bacon, and a hand's breadth thick, but not giving out much fluid oil.

Fig. 1014 represents a Greenlander in his kajak hunting seals.

Seals' flesh, says Crantz, supplies the Greenlanders "with their most palatable and substantial food; the fat furnishes them with oil for lamp-light, chamber and kitchen fire; and whoever sees their habitations presently finds that, even if they had superfluity of wood, it would not be of use, they can use nothing but oil in them. They also mollify their dry food, mostly fish, with oil; and finally they barter it for all kinds of necessaries with the factor. They can sew better with fibres of the seals' sinews than with thread or silk; of the skins of the entrails they make window-curtains for their tents, and shirts; part of the bladder they use as a float to their harpoons, and they make oil-flasks of the stomach. Neither is the blood wasted, but is boiled up with other ingredients and eaten as soup. Of the skin of the seal they stand in the greatest need, because they must cover with seal-skins both the large and small boats in which they travel and seek their provisions. They must also cut out of them their thongs and straps, and cover their tents with them, without which they could not subsist in summer. No man therefore can pass for a right Greenlander who cannot catch seals. This is the ultimate end they aspire at in all their device and labour from their childhood up." To the Greenlander, then, the sea is his pasturage, where his flocks and herds are fed; the sea is his hunting-domain, where, in his light kajak, he skims over the waves.

"There tumbling in their seal skin-boat,
Fearless the hungry fishers float,
And from teeming seas supply
The food their niggard plains deny."

ORDER CHEIROPTERA, OR BATS.

We regard the Bats (Family *Cheiroptera*, Cuvier, *Vespertilionidæ*, Gray) as constituting a distinct order, as it stands in the Catalogue of Mammalia in the 'Mus. Zool. Soc.,' 1838.

The Bats, or Flitter-mice (Fledermauser of the Germans, Pipistrelli and Nottoli of the Italians, Chauvesouris of the French), are termed Cheiroptera, that is, wing handed (χειρ, a hand, πτερον, a wing), because their anterior limbs are modified as organs of flight. Of all the mammalia the bats alone emulate the feathered tribes in their aerial endowments. They are essentially flying Insectivora: in the air they pass the active portion of their existence and revel in the exercise of their faculties. Their organs of flight, however, consist not, as in the bird, of stiff feathers disposed in order and based upon the bones of the fore-arm, but of a large thin membrane stretched over and between the limbs, to which the bones act as stretchers, like the strips of whalebone in an umbrella, the tail in many species assisting also. Of this membrane the bones of the arms and hands are the principal supporters and levers of motion—we say hands, because though not graspers, such must the anatomist consider them. All these bones, those of the carpus excepted, are slender and remarkably elongated, and here we refer to the skeleton of the bat (Fig. 1015). The humerus, *f*, is long and slender but much more so is the radius *g*, the only complete bone of the fore-arm, the ulna, *h*, being reduced to a mere rudiment. The carpus, *i*, consists of six bones in two rows, the first row having two, the second row four bones, on which are based the metacarpal bones of the thumb, *k*, and of the fingers *l*. These bones of the fingers are very slender and of extraordinary length, diverging from each other as they proceed. They are, however, moveable upon the metacarpus and are not only capable of closing together, but of being folded down in contact with the fore-arm. The phalanges or true finger-bones *m* carry on the elongation of this framework and taper to a point, like the extremity of an angling rod, unfurnished with nails or claws. These fingers are essential not only for carrying out the wing to a due distance, but for keeping its margins stretched out, and for folding it down when requisite. In some genera the first finger consists but of one very fine bone, the second finger consists of three; occasionally the first finger is tipped with a very small hook like nail. The thumb *k* is free, and usually short, consisting of a metacarpal and two digital bones, the last of which is armed with a strong hooked claw. Such then is the hand of the bat, essentially an apparatus for flight. Thus designed and constructed, rotation of the fore-arm would not only be an unnecessary but indeed an inconsistent endowment, its motion therefore, is simply hinge like, while that of the shoulder is to a great extent rotatory.

It will easily be conceived that a membrane so extensive as the wing of the bat will require for its effective movements an extraordinary development of the muscles which govern it. That part of the skeleton, therefore, on which these muscles are fixed is accordingly modified: the clavicles *d* and scapula, *e*, are of great magnitude and strength; the sternum, or breast bone, though narrow has a keel like elevation along its anterior surface analogous to what is seen in birds, while its upper end is developed into a manubrium *a* for the support of the large clavicles, which are thus thrown far laterally, the pectoral muscles being at the same time exceedingly voluminous: indeed the whole of the osseous and muscular structure of the bat is concentrated upon its organs of flight. The hinder limbs can scarcely be regarded as organs of locomotion, they principally serve in conjunction with the tail where present to keep the membrane duly expanded—they are therefore comparatively feeble: the toes are five in number, and armed with sharp hooked claws by which the animal suspends itself while at rest in its retreat. When with folded wings the bat attempts to proceed along a level surface its movements, though tolerably quick, are awkward and shuffling, and it uses the claw of its thumb as a hook for catching hold of any irregularities in order to drag itself along: hence, on a smooth polished surface it is greatly embarrassed, but in the hollows of trees, in the crevices of masonry and in rough chinks or fissures, it can climb and crawl about with considerable facility, as also about the wire-work of a cage, as we have often witnessed. The ground, however, is not the destined province of the bat—the air is its home, it is here that these singular creatures are all alertness, pursuing their insect prey, and uttering their short sharp cry as they wheel in circling flights, or perform their abrupt and zigzag evolutions.

In the bat, the senses of smell and hearing, as might be concluded from the development and complication of their respective organs, are wonderfully acute. In several extensive genera, with a view to the refinement of these senses, we see the nose furnished with a membranous foliation or leaf of most delicate structure, and often complex in its arrangement, while the external membranous ears are large, expanded, and often united together, having folds or an inner reduplication and capable of being folded down. (See Fig. 1016, the head of Megaderma trifolium.) In short, both the osteological characters of the skull and the development of the external appendages, traversed by multitudes of nerves, announce the acuteness both of smell and hearing. But these creatures have another sense, that of feeling, so exquisitely refined as to require especial notice. The wings of these creatures consist, as we have stated, of a delicate and nearly naked membrane of great amplitude, and these, as well as the membranous tissues of the ears and nose, are abundantly supplied with nerves and have their sensibility so high as to afford something like a new sense which stands in the stead of sight. The modified impressions which the air in quiescence or in motion, however slight, communicates—the tremulous jar of the faintest current—its temperature, the indescribable condition of such strata as are in contact with different bodies, are all apparently appreciated by the bat. If its eyes be covered up—nay, if it be even cruelly deprived of sight, it will pursue its course about a room with a thousand obstacles in its way, avoiding them all, neither dashing against the walls nor flying foul of the smallest thing, but threading its course with the utmost precision and quickness and passing adroitly through apertures, or the interspaces of threads placed purposely across the apartment. This endowment, which almost exceeds belief, has been abundantly demonstrated by the experiments of Spallanzani and others: it is the sense of touch refined to an inconceivable degree of perfection, rendering the bat as trail in feeling as in habits.

Bats are all crepuscular or nocturnal, during the day they sleep in their recesses hanging head downwards, suspended by the hind feet. Numbers often congregate together on one common dormitory, and in Java and other adjacent islands one of the most extraordinary sights is that of a tree literally loaded with a crowd of huge roussettes or flying foxes (Pteropus) all clustered together in pendant rows along the branches. In our latitudes the bats all hybernate, hanging in the same manner as during their ordinary sleep, but whether this law of hybernation prevails among those species which are natives of the hotter regions does not appear to be satisfactorily determined; probably it does, for the tenrec (an animal allied to our hedgehog) hybernates in Madagascar, its native country.

The bats are extremely numerous and are distributed over every portion of the globe, excepting in the coldest latitudes: it is however in the warmer regions that they are the most abundant, and attain to the largest dimensions.

We have said that the bats are insectivorous: some, however, are bloodsuckers, and some, as the roussettes (Pteropus), eat fruit, plundering the gardens of their choicest productions. It would seem that some of the Brazilian bats also are frugivorous, devouring the fruit of the fig tree, and that it is almost impossible to prevent the mischief, as they will creep like mice under the netting spread to protect the trees.

In the bats the mammæ are two, and pectoral; the dentition varies; the symphysis of the lower jaw is firmly ossified as in man and the ape tribe; a slender stylet (see Fig. 1015) runs from the heel to support the interfemoral membrane. The bats are divided by Mr. Gray into five great sections or tribes, as follows, under two primary heads:—

I. Istiophori, or Leaf-nosed Bats. Nostrils placed in a bald space often elevated behind into a leaf, teeth acutely tubercular; index finger not clawed.

Tribe 1. Phyllostomina. Nose disc expanded into a leaf behind, simple, and pierced with the nostrils in front.

Tribe 2. Rhinolophina. Nose disc expanded into a leaf behind, and with a pit or process between the nostrils in front.

II. Anistiophori.—Simple-nosed Bats. Nostrils without a nasal leaf.

Tribe 3. Vespertilionina. Grinders acutely tubercular, wings broad and large, tail elongated and inclosed in the large conical interfemoral membrane; upper incisor teeth near the canines, with a central space.

Each nostril placed in front of a groove, with a spiral convolute outer margin lobed anteriorly.

Tribe 4. Noctilionina. Grinders acutely tubercular, wings long and narrow, body thin, tail thick, short, the tip appearing on the upper surface of the large interfemoral membrane.

Tribe 5. Pteropina. Grinders bluntly tubercular, nose simple, nostrils slightly produced, end of index-finger clawed, head conical, ears simple, wings long, lower joint of thumb long, united to the wing by a membrane, interfemoral membrane short, tail none, or short. Fruit-eating bats of Indian Islands and Polynesia.

Each of these tribes is again subdivided according to the variation of minor points of structure, the genera being arranged under each subsection, but to pursue the subject into these niceties would be here out of place; we, however, recommend our scientific readers to the 'Revision of the Genera of Bats,' &c., by J. E. Gray, F.R.S., published in the 'Magazine of Zoology and Botany,' No. XII.

Of the first tribe (Phyllostomina), our pictorial museum affords us several examples.

1017.—The Crenulated Javelin Bat.

(*Phyllostoma crenulatum.*) In the genus Phyllostoma the canine teeth are very strong. Dental formula:—Incisors, $\frac{4}{4}$, canines, $\frac{1-1}{1-1}$, molars, $\frac{5-5}{5-5}$ = 32. There are two nasal appendages, one like a horseshoe, the other like a leaf or spear head, rising up behind the former; the ears are large, with a dentellated inner slip (oreillon or tragus), the tongue is bristled with papillæ, the tail is variable in length, sometimes wanting. The present species, of which the habits and exact locality are unknown, is a native of America.

1018.—The Greater Javelin-Bat.

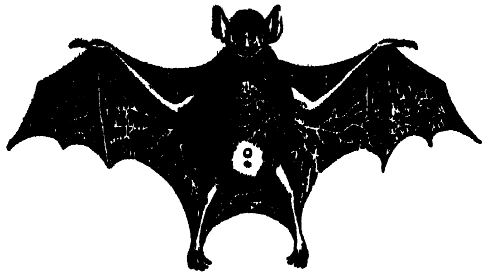
(*Phyllostoma perspicillatum.*) This species is a native of South America. Mr. Darwin found it at Bahia. Of its habits we have no details.

1019.—The Vampire Bat.

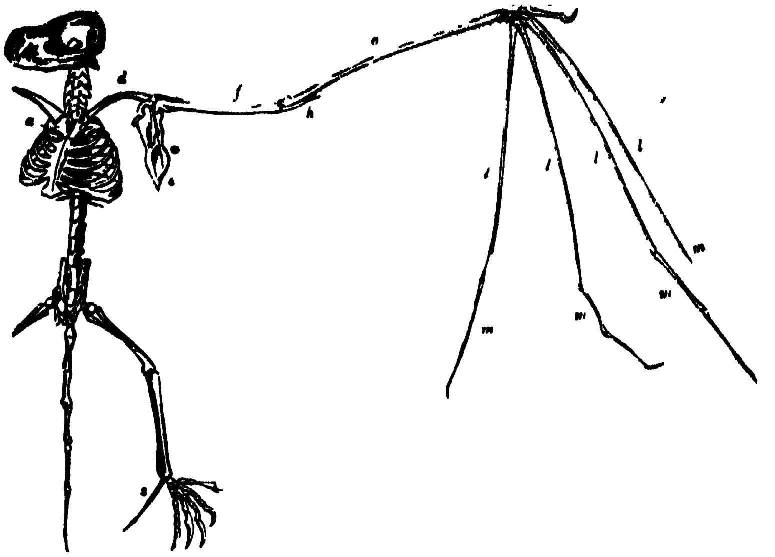
(*Vampirus spectrum.*) The genus Vampirus differs from Phyllostoma in having one molar more on each side in the upper jaw. Fig. 1020 shows the characters of the incisors and canines.

This species, the Andira Guacu of Piso, is a native of South America: its total length is about six inches. Piso thus describes its habits:—"These bats seek out every kind of animal and suck their blood, but in Maranham there is a certain kind which approaches by night the naked feet of men and wounds them for the sake of sucking human blood. The bite is so slight and subtle, that the wounded do not feel it before the bed covered with blood gives token of the wound. So great a quantity of blood flows from the envenomed bite, that it can only be stopped with difficulty, and the peril is imminent unless a cure by the prescribed remedies be effected. The inhabitants first wash these wounds with sea water, and afterwards apply hot ashes or even cautery, if the blood be not stopped." Captain Stedman, who states that he was bitten, thus describes the operation:—"Knowing by instinct that the person they intend to attack is in a sound slumber, they generally alight near the feet, where, while the creature continues fanning with its enormous wings, which keeps one cool, he bites a piece out of the tip of the great toe, so very small, indeed, that the head of a pin could be scarcely received into the wound, which is consequently not painful; yet through this orifice he continues to suck the blood until he is obliged to disgorge. He then begins again, and thus continues sucking and disgorging till he is scarce able to fly, and the sufferer has often been known to sleep from time into eternity. Cattle they generally bite in the ear, but always in places where the blood flows spontaneously. Having applied tobacco ashes as the best remedy, and washed the gore from myself and my hammock, I observed several small heaps of congealed blood all round the place where I had lain upon the ground, on examining which the surgeon judged I had lost at least twelve or fourteen ounces during the night."

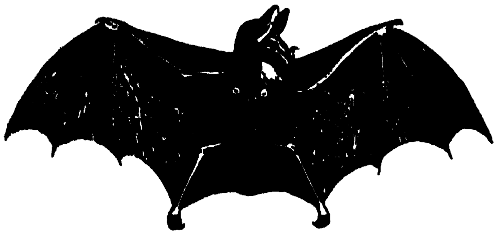
From these and similar accounts, themselves a little overcoloured, have arisen extravagant representations and false statements, to which too much credit has been given: blood sucking propensities, moreover, have been attributed to the bats of Java and other countries, without any authority, and the tongue, instead of the sharp lancet like teeth, has been regarded as the instrument by which the puncture is made. D'Azara, speaking of the bloodsucking bats of South America (and he is a faithful describer), observes that "the species with a leaf upon the nose differ from the other bats (of Paraguay) in being able to run when on the ground, nearly as fast as a rat, and in their fondness for sucking the blood of animals. Sometimes they will bite the wattles and crests of fowls while asleep, and suck their blood. The fowls generally die of this, as gangrene is engendered in the wounds. They bite also horses, mules, asses, and horned cattle, usually on the shoulders, buttocks, or neck, as they are better enabled to arrive at those parts, from the facilities afforded them by the mane and tail. Nor is man himself secure from their attacks: on this point I am able to give a very faithful testimony, since I have had the ends of my toes bitten



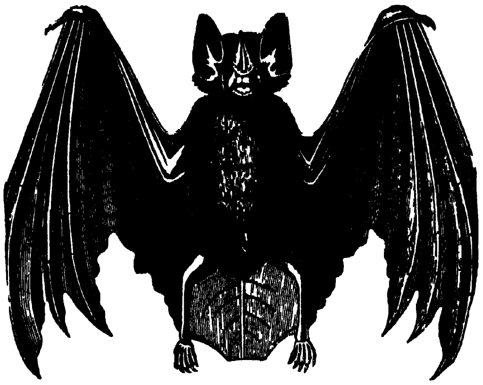
1016. Greater Javelin-Bat



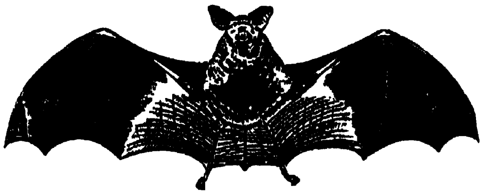
1015.—Skeleton of Bat



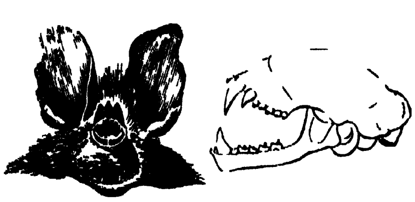
1019.—Vampire Bat.



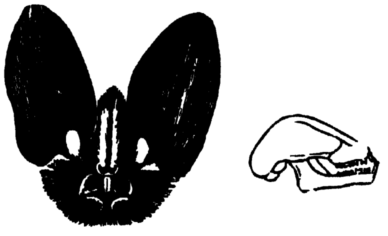
1017.—Crenulated Javelin Bat



1022.—Splendid Horseshoe-Bat

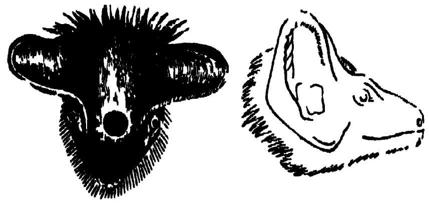


1023.—Three-toothed Horseshoe-Bat

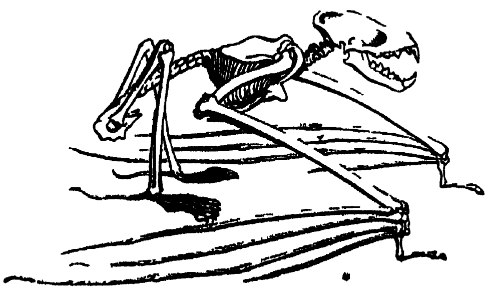


Nycteries

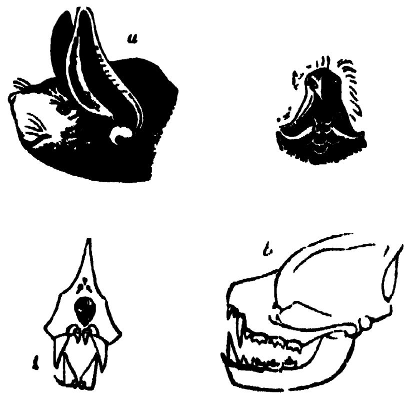
1020



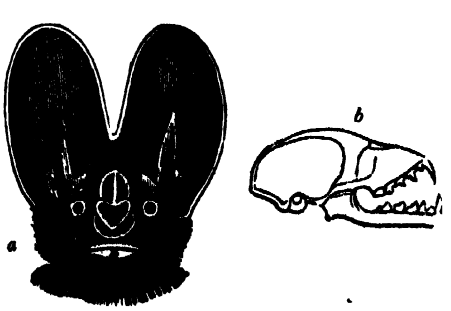
1028.—Mauritius Taphozous.



.021.—Skeleton of Vampire.

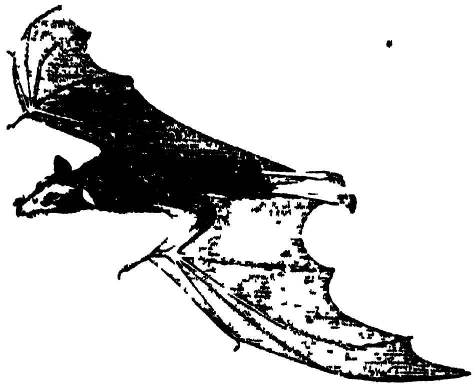


1029.—Leporine Noctilio.



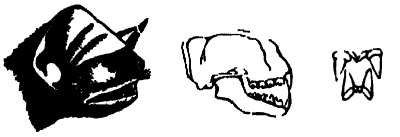
1018.—Trifoliated Megaderma.

1031.—Amboyna Ptero



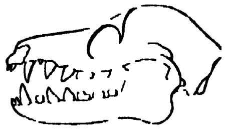
1033. Kalong

1036.—Pallas's Molucca Bat.

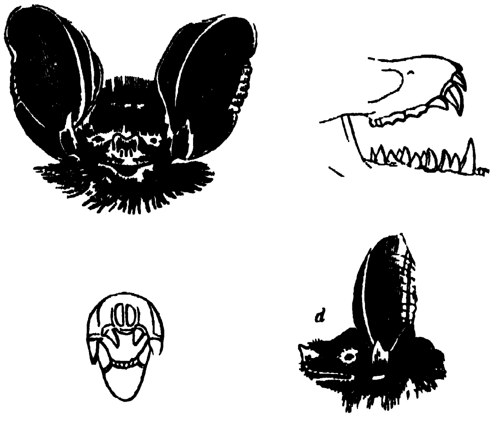


1030.—Head, Skull, and Front Teeth of Dusky Molossus.

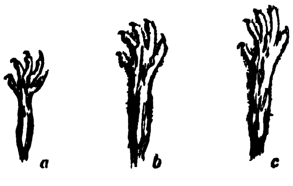
1026.—Head and Skull of Common Bat



1035.—Kalong



1037.—Timor long eared Bat.



1041.—Feet of Shrews

1038.—Common Shrew.

1039.—Teeth of Shrew.

1037.—Common Shrew

by them, four times, while I was sleeping in the cottages in the open country. The wounds which they inflicted, without my feeling them at the time, were circular, or rather elliptical, their diameter was trifling and their depth so superficial as scarcely to penetrate the cutis." The blood drawn "is merely from the capillary vessels of the skin, and is extracted thence, beyond doubt, by the action of sucking or licking." Nobody "fears these animals or gives himself any trouble about them."

To the same effect is Mr Swainson's testimony "They are constantly in the habit of attacking animals during the night and sucking their blood. Our own horses and mules on many occasions, after having arrived at the end of the day's journey and being turned out to graze, would be brought in by the guides in the morning with their shoulders and haunches covered with blood, neither is it an uncommon thing for these real vampires to enter the habitations of the natives, and fasten on the legs of some incautious sleeper who has not snugly secured his feet beneath the coverlid. Stories, indeed, are told of these incautious sufferers having bled so profusely as to have died, but we never could ascertain the fact, nor did we ever suffer from the visits of these midnight phlebotomists."

Mr Darwin was fortunate enough to capture a bloodsucking bat (Desmodus D'Orbignyi, Waterhouse) in the act. "The vampire-bat," says Mr Darwin, in that part of his highly interesting book which relates his adventures when travelling on horseback in the neighbourhood of Rio Janeiro, "is often the cause of much trouble by biting the horses on their withers. The injury is generally not so much owing to the loss of blood as to the inflammation which the pressure of the saddle afterwards produces. The whole circumstance has lately been doubted in England: I was, therefore, fortunate in being present when one was actually caught on a horse's back. We were bivouacking late one evening near Coquimbo, in Chile, when my servant, noticing that one of the horses was very restive, went to see what was the matter, and fancying he could distinguish something, suddenly put his hand on the beast's withers, and secured the vampire. In the morning the spot where the bite had been inflicted was easily distinguished, from being slightly swollen and bloody. The third day afterwards we rode the horse without any ill effects."

"It is interesting" says Mr Waterhouse, "to find that the structure of the animal is in perfect accordance with the habits above detailed by Mr Darwin. Among other points, the total absence of true molars, and the consequent want of the power of masticating food, is the most remarkable: on the other hand we find the canines and incisors perfectly fitted for inflicting a wound such as described, while the small size of the interfemoral membrane (giving freedom to the motions of the legs) together with the unusually large size of the thumb and claw, would enable the bat, as I should imagine, to fix itself with great security on the body of the horse." ('Zool. of Beagle,' No. 1 of Part II., p. 2.)

Fig. 1021 represents the skeleton of a species of vampire, as figured by De Blainville.

1016.—THE TRIFOLIATED MEGADERMA

(*Megaderma trifolium*). In the genus Megaderma the nose leaf is simple and erect, the wings and ears are very large, there is no tail, incisor teeth wanting. The Megaderma trifolium inhabits Java, where it is called Lovo by the natives. *b* represents the skull of the Megaderma frons of Western Africa.

Passing to the second tribe, Rhinolophina, we find the following examples.

1022.—THE SPLENDID HORSESHOE-BAT

(***Rhinolophus** nobilis*, Horsf.; Hipposideros nobilis, Gray). This fine species, a native of Java, is called Kêbblêk by the Javanese. The nasal apparatus consists of a broad membrane stretching transversely across the nose in form of a shell: the sides are bounded by several parallel folds and interiorly it constitutes a semicircular envelope, which has a short, obtusely rounded point in the middle. Colour above, pure brown; beneath, brown, variegated with grey. Fur remarkably long and silky, and supplied with a most delicate down at the base, so as to be throughout very soft to the touch. Body four inches in length. Expansion nineteen inches and a half.

1023.—THE THREE-TOOTHED HORSESHOE-BAT

(***Rhinolophus** tridens*, Geoff.), Hipposideros tridens, Gray. This is a small species, found in great numbers in the tombs of Egypt, where the objects of ancient idolatry are, indeed, given "to the bats," which find in the recesses and chambers of temples and pyramids a congenial retreat.

Of the third tribe, Vespertilionina, the following are specimens:—

1024.—GEOFFROY'S NYCTERIS

(*Nycteris Geoffroyi*). We have already alluded to the sensibility with which the integuments of the bats are endowed; this, however, is not the only peculiarity to be noticed, for in the genus Nycteris there exists a power of inflation to such a degree, that when the faculty is exerted, the animal looks, according to Geoffroy, like a little balloon fitted with wings, a head, and feet. The subcutaneous tissue is the part inflated, and as the skin adheres to the body at particular points only, the connexion being by means of loose cellular membrane, spaces are left which can be filled with air at the will of the Nycteris, through the cheek-pouches, which are perforated at the bottom so as to communicate with those spaces. When the Nycteris wishes to inflate its skin, it draws in its breath, closes its nostrils, and transmits the air through the perforations of the cheek pouches, to the subcutaneous spaces, and the air is prevented from returning by the action of a sphincter, which closes those openings, and by valves of considerable size on the neck and back.

The characters of this genus may be thus summed up:—a deep furrow down the forehead, nostrils covered by a cartilaginous moveable lid, interfemoral membrane very large, comprehending the tail, which terminates in a little bifid cartilage; incisors, $\frac{4}{6}$, molars, $\frac{4-4}{5-5}$; ears large, united at their base. Geoffroy's Nycteris is a native of the Thebaid and Senegal.

Fig. 1025, three British bats: *a*, the Common Bat (Vespertilio pipistrellus); *b*, the Great Bat (V. noctula); *c*, the Long-eared Bat (Plecotus auritus). Fig. 1026 represents the head and skull of the Vespertilio pipistrellus. Fig. 1027, the head and skull of the Timor Long-eared Bat (Plecotus Timoriensis); *b*, front view of the teeth; *c*, profile of the skull; *d*, profile of the head.

Of tribe 4, Noctilionina, the following are examples:—

1028.—THE MAURITIUS TAPHOZOUS

(*Taphozous Mauritianus*). In the genus Taphozous there are no incisor teeth on the upper jaw. Several species are known; the one of which we represent the head is a native of the Mauritius.

1029.—THE LEPORINE NOCTILIO

(*Noctilio leporinus*). Canines very strong, muzzle short and swollen, and divided and studded with fleshy tubercles or warts, nose simple, and losing itself in the lips, ears small and lateral, interfemoral membrane very much developed, tail enveloped at its base. Dental formula:—incisors, $\frac{4}{2}$, canines, $\frac{1-1}{1-1}$, molars, $\frac{4-4}{5-5} = 28$.

Fig. 1029: *a*, profile of head; *b*, profile of skull; *c*, front view of muzzle; *d*, front view of teeth.

The Noctilio leporinus is of the size of a rat. Fur of a uniform reddish-yellow. This is the Vespertilio leporinus of Gmelin, Noctilio unicolor of Geoffroy. Localities—Brazil, Peru, and Paraguay.

1030.—THE DUSKY MOLOSSUS

(*Molossus obscurus*). Head short, muzzle swollen, ears large, earlet external; interfemoral membrane straight, with a square termination, tail long, enveloped at its base, and most frequently free at its extremity. Dental formula:—Incisors, $\frac{2}{2}$, canines, $\frac{1-1}{1-1}$, molars, $\frac{5-5}{5-5} = 28$. The geographical distribution of this form is wide: Africa, Asia and South America possess it, but the species which are numerous occur principally in the two last-mentioned localities.

The Molossus obscurus (Molossus fumarius of Spix; Dysopes obscurus of Temminck) is of the size of the Barbastelle of Europe. Fur composed of hair of two colours, blackish brown above, and ash-brown below. Whiskers at the border of the lips. Length about three inches three lines. Expansion nine inches. Localities, Brazil and Guiana.

The fifth tribe, Pteropina, contains the following:—

1031.—THE AMBOYNA PTEROPUS

(*Pteropus Dussumieri*). The Roussettes, Ternate Bats or Flying Foxes as the Pteropi are termed, are, most of them, of large size, with fox-like heads and a vast spread of wing; the molars are $\frac{5-5}{6-6}$ or $\frac{4-4}{6-6}$, and bluntly tubercular; the tongue is short; interfemoral membrane very little developed. Fig. 1032 represents the skull of Keraudren's Roussette. The present species is a native of India and Amboyna, and is of large size; its manners closely resemble those of the kalong.

1033, 1034, 1035.—THE KALONG

(*Pteropus Javanicus*). This species, which measures five feet in the spread of the wings, is a native of Java. The upper part of the neck is smoky-red, the rest of the fur dull black. In the lower parts of Java it is very common, and lives in troops, which do not appear to visit the more elevated districts. Numerous individuals, says Dr. Horsfield, select a large tree for their resort, and, suspending themselves by the claws of their hind-limbs to the naked branches, often in companies of several hundreds, afford to a stranger a very singular spectacle. A species of Ficus, resembling the Ficus religiosa of India, which is often found near the villages of the natives, affords them a very favourite retreat, and the extended branches of one of these are sometimes covered with them. They pass the greater portion of the day in sleep, hanging motionless; ranged in succession with the head downwards, the membrane contracted about the body and often in close contact, they have little resemblance to living beings, and by a person not accustomed to their economy are readily mistaken for a part of the tree, or for a fruit of uncommon size suspended from its branches. In general these societies preserve a perfect silence during the day, but if they are disturbed, or if a contention arises among them, they emit sharp piercing shrieks, and their awkward attempts to extricate themselves when oppressed by the light of the sun exhibit a ludicrous spectacle. In consequence of the sharpness of their claws, their attachment is so strong that they cannot readily leave their hold without the assistance of the expanded membrane; and if suddenly killed in the natural attitude during the day, they continue suspended after death. It is necessary, therefore, to oblige them to take wing by alarming them, if it be desired to obtain them during the day. Soon after sunset they gradually quit their hold, and pursue their nocturnal flight in quest of food. They direct their course, by an unerring instinct, to the forests, villages, and plantations, occasioning incalculable mischief, attacking and devouring indiscriminately every kind of fruit, from the abundant and useful cocoa-nut which surrounds the dwelling of the meanest peasantry, to the rare and most delicate productions which are cultivated with care by princes and chiefs of distinction. By the latter, as well as by the European colonists, various methods are employed to protect the orchards and gardens. Delicate fruits, such as mangoes, jambus, lansas, &c., as they approach to maturity, are ingeniously secured by means of a loose net or basket, skilfully constructed of split bamboo. Without this precaution, little valuable fruit would escape the ravages of the kalong. There are few situations in the lower parts of Java in which this night-wanderer is not constantly observed: as soon as the light of the sun has retired, one animal is seen to follow the other at a small but irregular distance, and this succession continues uninterrupted till darkness obstructs the view. The flight of the kalong is slow and steady, pursued in a straight line, and capable of long continuance. The chace of the kalong forms occasionally an amusement of the colonists and inhabitants during the moonlight nights, which in the latitude of Java are uncommonly serene. He is watched in his descent to the fruit-trees, and a discharge of small shot readily brings him to the ground. By this means I frequently obtained four or five individuals in the course of an hour.

1036.—PALLAS'S MOLUCCA BAT

(*Harpyia Pallasii*). The genus Harpyia of Illiger (not of Cuvier) differs in having the wings arising from the centre of the back, the lips thick, and the head broad and short, index finger clawed. The Harpyia Pallasii (Cephalotes Pallasii, Geoffroy) is a native of the Moluccas. It measures two feet in the expansion of the wings. The dental formula is thus:—Incisors, $\frac{2}{0}$; canines, $\frac{1-1}{1-1}$, molars, $\frac{4-4}{5-5}$.

Of the habits of this species we have no details. It may surprise some to learn that fourteen distinct species, referable respectively to the genera Rhinolophus, Barbastellus, Plecotus, Vespertilio, and Scotophilus, are indigenous in our island. Of these, however, several are extremely rare and restricted to certain localities, but some, as the Pipistrelle (Vespertilio Pipistrellus, Geoffr.; Scotophilus communis, Gray), the long-eared bat (Plecotus auritus), are everywhere abundant. Nor is the Great Bat (Vespertilio Noctula, Schreb.; Scotophilus Noctula, Gray) of unfrequent occurrence.

For an account of the habits and manners of our British bats, we may here refer to the 'Penny Magazine' for January, 1843, where the reader will find some interesting details.

ORDER INSECTIVORA.

The animals of this order, as the name implies, are specially appointed to check the overwhelming increase of the insect world, to assist in the work of warfare against hordes of beings individually insignificant, but which, if permitted to multiply uncontrolled, would render the labours of many fruitless. Insects, and especially their larvæ, with slugs, worms, and other creeping things, constitute their food. It is not among the Insectivora that we are to look for the powerful, the fierce, and the terrific. Timid little creatures, they neither alarm us by their presence, nor force themselves upon our notice by their powers or ferocity. Of unobtrusive habits, they elude our cursory observation. They flee from our approach, and they remain in concealment till man withdraws from his labours in the evening, and leaves field and woodland to their revels and enjoyments. Hence it is that their manners and instincts are neither very generally not very definitely understood. It is true that the structure of their teeth, of which the molars are crowned with sharp elevations, declare the nature of their food, at least to the eye of the naturalist—and that of many, as the mole, their general organization would lead us to infer certain modes of life; but beyond these points the observation of the animals themselves, living and in the enjoyment of freedom, must instruct us, for by this alone can their nicer instinctive peculiarities be ascertained.

1037, 1038.—The Common Shrew.

(*Sorex tetragonurus*.) Sorex araneus, Bell, but not of the continental authors. The Shrews (genus Sorex, divided by Duvernoy into three subgenera, viz. Sorex, Hydrosorex, Amphisorex) constitute a numerous group of little animals, still in much confusion, partly owing to the difficulty of determining the species, and partly to the contrary specific titles which have been given to many of the European species by British and continental naturalists; the latter points indeed have been recently cleared up by the Rev. L. Jenyns, who has also added some new species to the British list.

In the genus Sorex, including the subgenera, the dentition is as follows:—Middle incisors, $\frac{2}{2}$, lateral incisors, or false molars (in Sorex), $\frac{3-3}{3\ \ 3}$ or $\frac{4-4}{4\ \ 4}$, (in Hydrosorex), $\frac{5-5}{2\ \ 2}$, (in Amphisorex), $\frac{4-4}{2\ \ 2}$, canines, $\frac{0\ \ 0}{0-0}$, molars, $\frac{4-4}{3-3}$. The true or middle incisors are much produced; the upper ones are curved and notched at the base; the lower ones are almost horizontal, with a smooth edge in Sorex, a denticulated edge in Hydrosorex, and a smooth edge, but in this subgenus the two first false molars above are of equal size, while in Sorex they diminish rapidly in size from the first to the last. Fig. 1039 represents the dentition of a species of shrew taken in the Mauritius, six times larger than nature.

The Shrews may be known by their long taper moveable snout, their velvety fur, and their extremely minute eyes, almost hidden in the surrounding hairs; the ears are small and close; the tail moderately long, and a musky odour is exhaled from small glandular orifices, surrounded by stiff close hairs, situated on the sides of the body. This odour renders the shrews distasteful to the cat (though the latter readily destroys them), but not to weasels, hawks, or owls, which are great enemies to these little nocturnal insectivora.

The common shrew is of a reddish mouse colour, paler beneath; the tail is quadrangular in adults, rather shorter than the body, and not ciliated beneath. Length of head and body, two inches seven lines; of the tail, one inch ten lines.

This little animal is common in our island, frequenting tufted banks, hedge rows, thickets, gardens, farm-yards, &c. and feeding on worms and insects, caterpillars, &c., after which it grubs with its long pointed snout among the close herbage or under the soft loose soil. It is very impatient of hunger and extremely pugnacious, two seldom meeting without engaging in combat, and if two be confined together in a box the weaker falls a prey to the stronger, and is soon partially devoured. Many are killed and eaten by the mole, and in August numbers are often found dead in the lanes, and pathways across the fields; but to what cause their destruction is owing, at the season in question, is not very apparent. As was the case with the hedgehog and some other animals, superstition and ignorance have attributed the most baneful properties to the shrew; it was supposed by our ancestors to paralyse the limbs of cattle by merely creeping over them, afflicting them with excruciating torments, and to poison them by its bite. Aristotle, Pliny, and Agricola also attribute poisonous effects to the bite of the shrew, which, as they assert, produces tumours and ulcerations. Agricola states that the Latins called the animal mus araneus from its injecting venom into the wound it makes, as does the spider (aranea), and he notices the characters of the teeth and quadrifid figure of the wound they inflict, adding that in warm regions the wound is generally pestiferous, but not in cold climates. His remedial prescription is to place the body of the shrew cut asunder on the injured part. Among our ancestors the remedies were to make the person or animal pass through the arch of a bramble rooted at both ends, or to apply to the limbs of suffering cattle the twigs or leaves of a shrew ash, that is an ash into the trunk of which a deep hole had been bored, and a poor devoted shrew plugged in alive.

The voice of the shrew is a shrill, feeble chirring cry, which may be often heard when the animal is unseen; we have known persons whose ears were unable to catch it, however attentively they have listened, though of other tones they were perfectly susceptible.

The shrew makes long superficial burrows in banks and among the roots of trees and brushwood; the female makes a nest in her retreat of soft herbage with an aperture at the sides; she breeds in the spring, producing from five to seven young.

1040.—Three British Shrews.

This plate represents three British Shrews: *a*, the Oared Shrew, Sorex remifer, Geoff. (Sorex ciliatus, Sowerby); *b*, the Water Shrew (Sorex fodiens, Gmelin, not of Duvernoy nor of modern continental authors; Sorex bicolor, Shaw); *c*, the Common Shrew which we have described (Figs. 1037 and 1038).

The water shrew is nearly black above, white beneath, the colours being abruptly separated; the sides of the feet and the under surface of the tail are ciliated or fringed with long stiff white hairs. Length of head and body three inches and three lines, of the tail two inches one line.

This elegant little animal is aquatic in its habits, frequenting clear fresh water ditches and brooks, in the banks of which it makes extensive burrows. It swims and dives with great address, the sides being spread out, the belly flattened, and the tail extended as a rudder. When diving, the black velvety coat of the animal appears as if beautifully silvered from the innumerable bubbles of air that cover it. These are pressed out of the fur, which repels the water, the animal being quite dry when it emerges. It has the power of completely closing the orifices of the ears so as to exclude the water while beneath the surface. The food of the water shrew consists of insects, the larvæ of ephemeræ, and perhaps the ova of fishes; in quest of these it swims and dives or grubs in the mud with its snout. These little water shrews form colonies in certain spots, making runs or tracks along the banks, leading from their subterranean dwellings to the water; when two meet in these, or while swimming about, they utter their shrill feeble querulous cry, perhaps a token of recognition. The water shrew, though only recognised as a native of our island within the last few years, is not uncommon in most of our counties, and has been captured in Scotland and Devonshire.

The oared shrew is closely allied to the water shrew, and appears to have the same aquatic habits. The tail is quadrangular and compressed towards the apex, and is ciliated on the under surface; the feet are strongly ciliated; the body is black above, greyish black below; the throat is of a yellowish colour. It is of about the size of the former. Fig. 1041 represents the under surface of the hinder feet of *a*, the common shrew; *b*, the water shrew; *c*, the oared shrew.

1042.—The Desman.

(*Mygale moschata*.) Biesamratze of the Germans; Wychozol of the Russians. The genus Mygale, Cuv. (Myogalla, Fischer; Castor moschatus, Linn.) presents us with the following dental characters:—Incisors, $\frac{2}{8}$, canines, $\frac{0-0}{0-0}$, molars, $\frac{10\ \ 10}{7\ \ 7}$; of the molars the first seven on each side above and the first four below are false; between the two large incisors below are two minute teeth, and the two upper incisors are flattened and triangular. See Fig. 1043 for the teeth of the upper jaw. In these animals the snout is elongated into a flexible proboscis furrowed down the middle, which they are incessantly turning about; the tail is long, thick, scaly, and compressed at the sides; the eyes are very small; external ears wanting; the fur is full, deep, soft, and glossy, like that of the beaver; the feet are broad and completely webbed; toes five in number. Two species are known, both aquatic in their habits: the one is the desman or musk rat of Russia; the other, a smaller species, is found in the Pyrenees.

The desman measures upwards of ten inches in the length of the head and body, that of the tail being seven (from specimen in Paris Museum). This beaver-like aquatic shrew is abundant in the lakes and rivers of Southern Russia, feeding on worms, aquatic insects, fish, and especially leeches, which it searches for in the mud at the bottom of the water with its long flexible snout. Its burrow is deeply hollowed out in steep overhanging banks, the entrance being below the level of the water, whence it rises gradually so as never to be filled during the highest floods. The desman seldom comes on shore voluntarily, but is often captured in the nets of the fishermen, and it is frequently seen swimming about or diving in pursuit of prey. It exhales a strong musky odour, the secretion of small glandular follicles at the root of the tail, and this flavour of musk it communicates to pikes and other fishes which prey upon it, rendering their flesh disgusting.

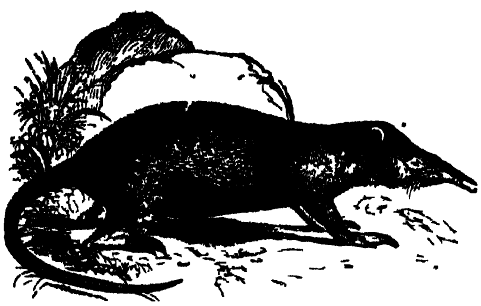
1044.—The Cape Elephant Shrew.

(*Macroscelides typicus*.) Allied to the shrews are some little animals peculiar to Africa, constituting the genus Macroscelides of Dr. A. Smith. They are called elephant mice or elephant shrews, from the proboscis-like form of the snout; but the scientific name bears reference to the jerboa-like elongation of the hinder limbs. The dentition is as follows:—Incisors, $\frac{2\ \ 2}{2\ \ 2}$, false molars (called canines by Dr. Smith), $\frac{4\ \ 4}{4\ \ 4}$, molars, $\frac{5\ \ 5}{5-5}$. Fig. 1045 shows the skull and teeth of Macroscelides: *a*, upper surface of the skull, natural size; *b*, profile; *c*, lower jaw; *d*, under surface of the skull, twice the natural size; *e*, the lower jaw, twice the natural size. The nostrils are at the apex of the proboscis, the eyes are moderate, the ears large and rounded, the tail rather long and like that of a mouse. Feet five-toed. The Cape elephant shrew (Macroscelides typicus) is the Sorex araneus maximus of Petiver. The fur is soft and long, the general colour is reddish brown, clouded on the back with a darker tint, the under surface white; the ears nearly naked, whiskers long. Length of head and body, three inches and three quarters; of tail, three inches and a quarter.

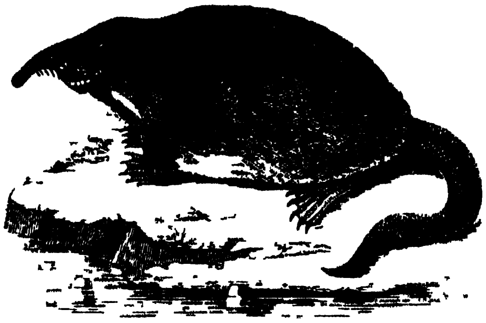
This curious animal inhabits open plains, and lives in burrows under ground, the passage to which runs for some distance almost perpendicularly downwards. During the day it seeks its food, and may be seen basking in the heat of the sun, sitting erect on its hinder legs in the full glare of the rays. When disturbed it flies immediately to its subterranean retreat, and with such velocity that it is impossible to make out its form or general appearance as it skims along. It feeds upon insects. Six or seven species are known peculiar to South Africa, and one a native of Algiers.

1046.—The Solenodon.

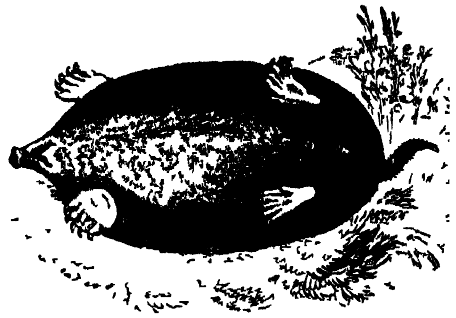
(*Solenodon paradoxus*.) The genus Solenodon of Brandt (Mém. de l'Acad. Impériale des Sciences de St. Petersbourg, tome ii, livr. 3me, 1833) contains, as far as is yet known, only one species, an animal peculiar to Hayti, where it is known under the name of Agouta. Allied in many respects to the genera Sorex and Mygale, in the character of the ears, the fur, and the tail it resembles the opossums (Didelphis). Its dentition approximates the most nearly to that of Mygale. In size the Solenodon exceeds a rat; its snout is lengthened into a slender naked proboscis, at the tip of which are the nostrils, with a furrow between them; the ears are moderate and rounded; the fur is coarse and long, and of a yellowish red; from the lips and cheeks proceed slender whiskers of great length; the limbs are stout; the toes, five on each foot, armed with large hooked claws; the tail is long, rat-like, and scaly, being destitute of hairs. Dentition as follows:—Incisors, $\frac{6}{6}$, false molars, $\frac{6\ \ 6}{6\ \ 6}$, true molars, $\frac{8-8}{8-8}$. The two middle incisors of the upper jaw are remarkable for their size and the distance between them and the succeeding incisors; they are compressed, pointed, and perpendicular. The zygomatic arch is incomplete, as in the shrews (Sorex), the Tanrecs (Centetes), the Echinops, &c. Fig. 1047 represents the skull and dentition of the solenodon: *a*, skull of solenodon (profile); *b*, seen from above; *c*, seen from below; *d*, mandible or lower jaw; *e*, anterior part of the intermaxillary bone with the two anterior incisor teeth; *f*, anterior surface of an anterior upper incisor tooth; *g*, anterior parts of the mandible, with the four anterior incisor teeth; *h*, the crown of a second or middle incisor tooth of the mandible, seen on its internal surface, and exhibiting its triangular canal. The foregoing figures are nearly of the natural size. *i*, teeth of the upper jaw seen laterally, 1, 1, nat.



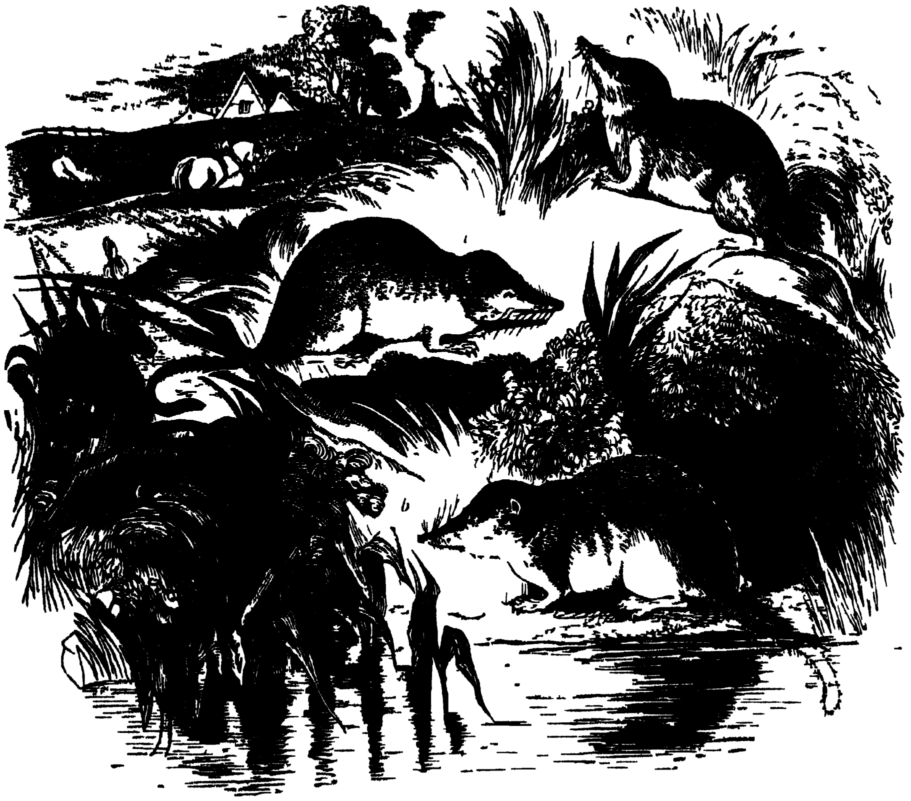
1046.—Solenodon.



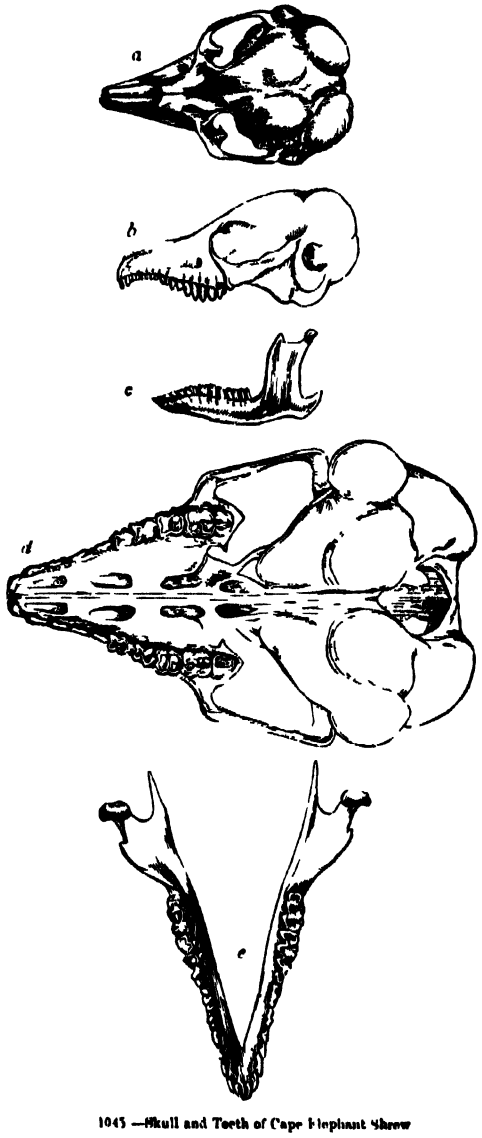
1042.—Desman



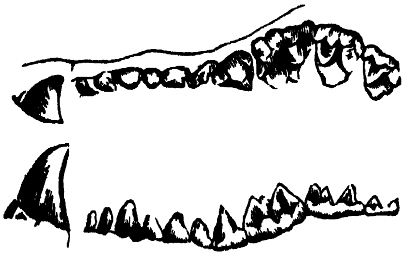
1039.—Shrew Mole



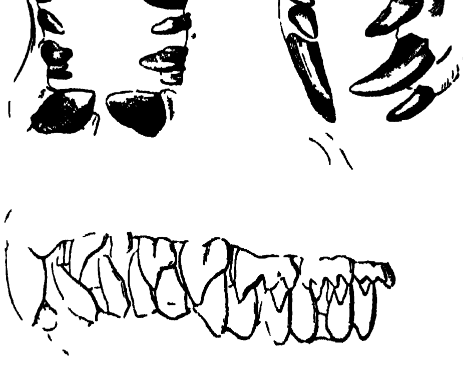
1040.—British Shrews

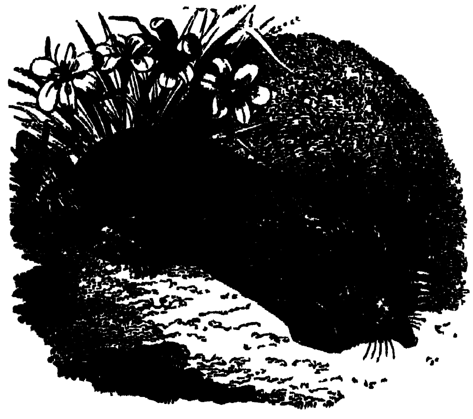


1043.—Skull and Teeth of Cape Elephant Shrew

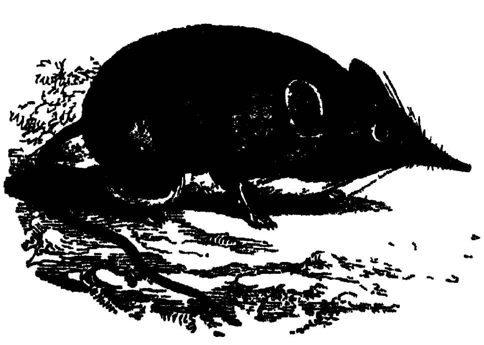


1 —Teeth of Desman

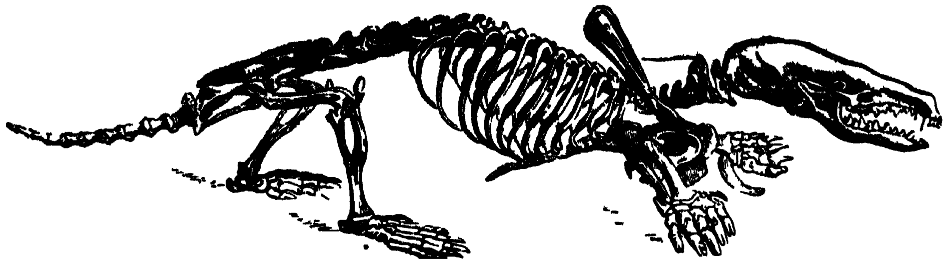


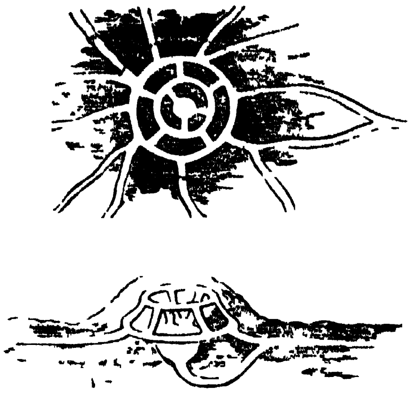


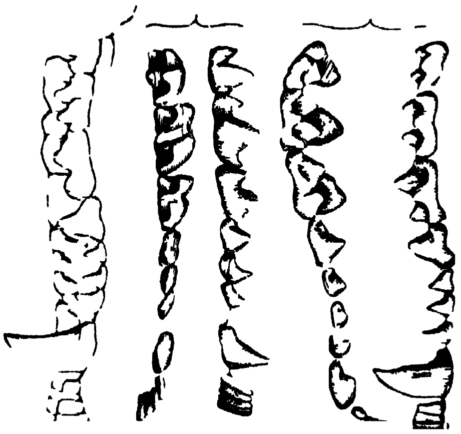
1051.—Mole

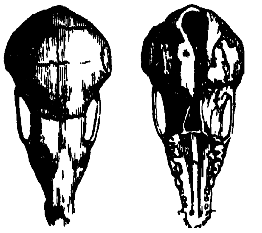


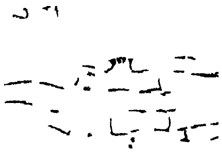
1044.—Cape Elephant-Shrew.

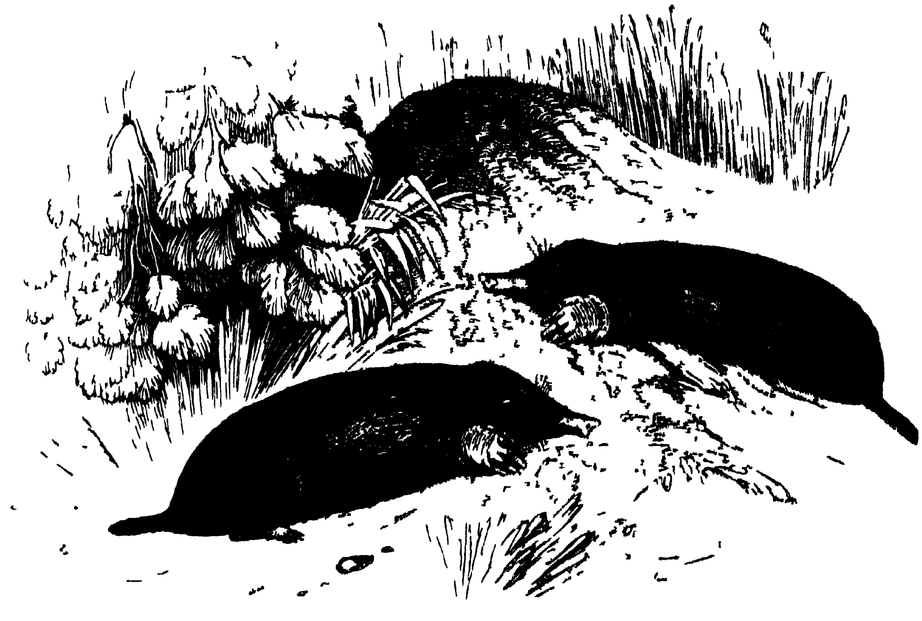

1053.—Skeleton of Mole

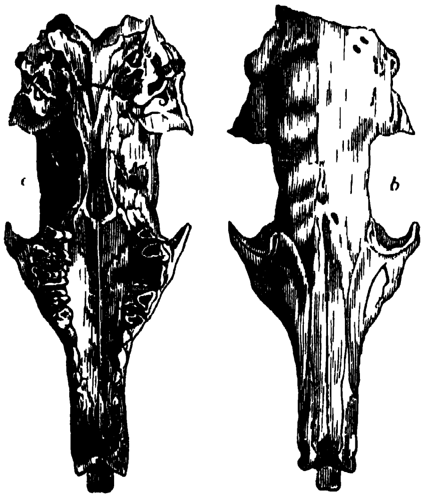

1056.—Habitation and Hunting-ground of Mole

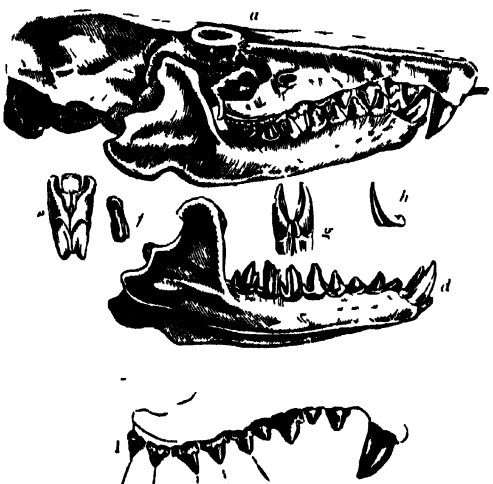

1055.—Teeth of Mole


1054.—Skull of Mole

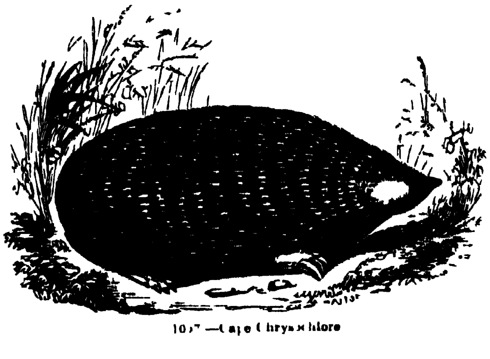

[illegible]—Feet of Star-nosed Mole

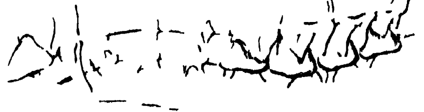

1052.—Common Mole

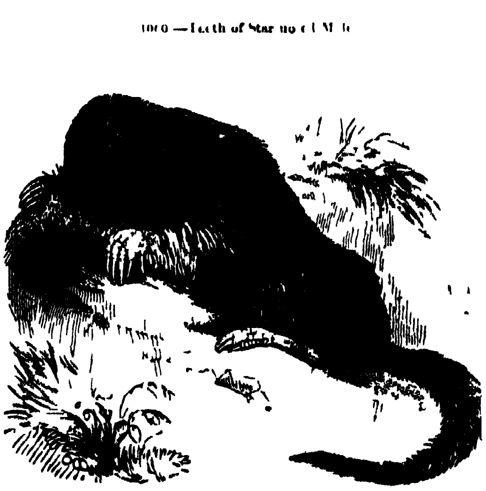


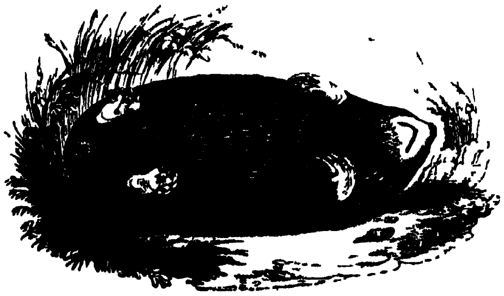


1047.—Skull and Teeth of Solenodon.


1057.—Cape Chrysochlore


1060.—Teeth of Star-nosed Mole


1059.—Star-nosed Mole


1058.—Cape Chrysochlore

2 F

[illegible]; 2, 2, magnified. (Brandt.) Fig 1048, *a*, the fore-foot of solenodon, upper surface; *b*, hind foot, upper surface.

Of the habits of the solenodon little is known: its strong claws and pointed snout, the base of which is supported by a stylet of bone, denote it to be a burrowing animal. An imperfect skin, in the museum of the Zoological Society, was sent by Mr Hearne from Hayti, who thus writes respecting it:—"The only quadruped, I believe, found on the island on the landing of Columbus was the agouta, a little larger than, and somewhat resembling a rat, with an equally long tail and a longer snout, whose food is chiefly grain, although the animal is carnivorous also: its hair is red. I had one alive, intended for the Society, but it received a wound from a cat, of which it died." ('Zool Proceeds,' 1835, p. 105)

1049.—The Shrew-Mole

(*Scalops canadensis*, Desm), Sorex aquaticus, Linn., Scalops aquaticus, Fischer. The animals of this genus are peculiar to North America. Their form is mole-like, the eyes are minute in the extreme, and scarcely to be discovered, there are no external ears, the fur is velvety, the fore-paws, like those of the mole, are adapted for burrowing, the tail is short; the teeth are—incisors, $\frac{2}{2}$, molars, $\frac{10-10}{10-10}$, or, according to F. Cuvier, $\frac{9-9}{9-9}$. See Fig 1050. The snout is long, tapering, flexible, and with a terminal disc.

The Canada shrew-mole measures about seven inches and a half long, exclusive of the tail, which is one inch and a half. The general colour is brownish black. It inhabits the banks of the Columbia and the adjoining coasts of the Pacific.

According to Dr Richardson, the shrew mole resembles the common European mole as much in habits as in form, forming galleries, throwing up mounds, and feeding on worms and grubs. Dr Godman states that these animals are most active in the morning, at midday, and in the evening, coming daily to the surface, when in their natural state, at noon, at which time they may be taken by driving a spade beneath them and throwing them on the ground, but they are not easily taken at any other part of the day. They burrow in a variety of soils, but in wet seasons retire to the high grounds. An individual kept in confinement by Mr T Peale, fed largely on fresh meat, cooked or raw, drank freely, was lively and playful, and would follow the hand of its feeder by scent, it would then burrow for a short distance in loose earth and after driving a circle, return for more food. It employed its flexible snout in a singular manner whilst it was eating, doubling it down, like a proboscis, upon its food so as to direct and force it into the mouth. An allied species (Scalops Townsendii) is a native of California, and another (Scalops Pennsylvanicus, Harlan) is found in Pennsylvania.

1051, 1052. The Common Mole

(*Talpa Europæa*) Mouldwarp and Mould' warp. Want in Dorsetshire and Devonshire, Wand, Old Danish, Vond, Norwegian, Maulwerf German, Mol, Dutch, Muldvarp, modern Danish, Mulvard and Surk, Swedish, La Taupe French, Talpa Latin and modern Italian, Topo, Spanish, Toupeiro, Portuguese, Gwadd and Twrch daear, ancient British.

We need not say that the mole is a miner, living an almost exclusively subterranean life, ever pursuing its prey through the soil, and working out long galleries in the chace. In accordance with its destined habits is the whole of its structural development. The body is cylindrical and compact, the snout prolonged and pointed, the limbs very short; the anterior pair present a thick, contracted arm, terminating in broad solid paws, with five fingers scarcely divided, and armed with strong flat nails. The tournure of these scrapers, for such they are, gives them an obliquely outward position, and facilitates their use as scooping instruments, by which the soil is not only dug up, but thrown backwards at each stroke, and that with great energy. The hinder limbs are small, and the feet feeble in comparison with the anterior scrapers, while the body tapers to them from the chest and shoulders, so the hinder quarters offer no impediment to the animal's progress through its narrow galleries. The fur, moreover, is such as best befits a subterranean dweller—it is extremely close, fine, short, and smooth, and resembles the nap of black velvet. There is no external conch to the organs of hearing, the sense of which is acute in the extreme, a simple auditory opening, capable of being closed or dilated at pleasure, leads to the internal apparatus, which is effectually defended from the intrusion of particles of earth or sand. At a cursory glance the mole appears to be destitute of eyes; they are however not wanting, though very small, and buried in the fur. A limited power of vision is sufficient for this dweller in the dark; the mole, however, can see better than might be imagined. By a peculiar muscular contrivance it is capable of bringing forward, or of drawing in, the eye—and this, when withdrawn, is enveloped in and defended by the close fur; so that, as is the case with the ear, no particles of earth can injure it. We have said that the sense of hearing is exquisite, and to it the mole trusts for warning on the approach of danger.—

> "Pray you, tread softly, that the blind mole may not
> Hear a foot fall."—Shakspere.

But the sense of smell is equally delicate, and by this it is guided in its search for food. It bores its long sharp nose in the earth as it traverses its galleries, and immediately detects worms and the larvæ of insects, which constitute its chief food. Nor is the feeling of this part at a low ratio; it is, on the contrary, very acute and susceptible, and aids the sense of smell in the procuring of food. The pointed snout is, indeed, a finger-like organ of prehension, as well as a boring instrument. The general skin of the body is strong and tough, and not easily torn or lacerated.

The osseous and muscular development of the mole exhibits a perfect correspondence with its external characters and the perfection of its senses. The great development of the skeleton (Fig 1053) is anteriorly, namely in the bones of the shoulders, arms, and chest. The skull (Fig 1054) is depressed above, elongated, and pointed, and the snout, continued beyond the maxillary and nasal bones, is supported by a little additional bone, produced by the ossification of the cartilage. Its boring faculties are rendered still more effective by the ossified condition of the ligament of the neck, which passes from the back of the skull, down the cervical vertebræ, and which in other animals is elastic. The teeth are small, exhibiting a decidedly insectivorous character, the molars being crowned with sharp-pointed tubercles or eminences. (See Fig 1055.)

It would appear that the subterranean labours of the mole are exerted in the accomplishment of very different objects. Each mole may be said to have its own district or manor, its hunting ground, and its lodges, and this ground is traversed by high-road tunnels, through which it travels from one part to another, all branching off from a central fortress, its ordinary residence, which is, however, not only distinct, but often remote from the chamber in which the nest is made and the young reared. We will begin by describing the fortress or ordinary domicile (Fig 1056).—This fortress is constructed under a hillock of considerable size (not one of those ordinarily thrown up every night, indicating its hunting excursions), and raised in some secure place, where a high bank, the roots of a tree, or the base of a wall, afford protection. The earth forming this mound is well compacted together, and made solid by the labours of the architect, and within this firm set mound is a complex arrangement of galleries and passages of communication. First, a circular gallery occupies the upper portion of the mound, and this communicates by means of five descending passages with another gallery at the base of the mound enclosing a larger area. These passages are nearly at equal distances. Within the area of this lower gallery is a chamber, not immediately communicating with it, but with the upper gallery, by three abruptly descending tunnels. This chamber is the dormitory of the mole. From the basal gallery opens a high road tunnel, which is carried out in a direct line to the extent of the manor over which the individual presides, and from the bottom of the central chamber a passage descends, and then sweeping upwards joins this main road at a little distance from the hillock, so that the mole can enter the high-road either from its dormitory or from the basal gallery. Besides the high-road, eight or nine other tunnels are carried out from the basal gallery, they are of greater or less extent, and wind round more or less irregularly, opening into the high road at various distances from the hillock; these irregular tunnels the mole is continually extending in quest of prey, throwing up the soil above the turf, through holes which it makes for the purpose, and which form the ordinary mole-hills which we often see crowded thickly together. The high or main road exceeds in diameter the body of the mole, and is solid and well trodden, with smooth sides, its depth varies, according to the quality of the soil, instinct directing the little excavator in his work. Ordinarily it is five or six inches below the surface, but when carried under a streamlet or pathway it is often a foot and a half beneath. It sometimes happens that the mole will drive two or more additional high roads in order to the extention of its operations; and one high-road occasionally serves several moles, which, however, never trespass on each other's preserves. They often meet in these roads which will not admit of two passing at the same time; one therefore must retreat, but when two males thus come into collision they frequently attack each other, the weaker falling a victim in the combat. The alleys opening from the sides of the high-road are generally inclined downwards with a gradual slope, and then at the termination of these the mole excavates branch alleys, upheaving mole-hills, as it works onwards in pursuit of prey. This, however, is not invariably the case, but rather where prey is abundant in rich soils; where the soil is barren, the mole is constantly driving fresh alleys; these in winter are carried deep down to where the worms have pierced their way beyond the line to which the frost penetrates, for, be it observed, the mole does not hybernate, but is as active during winter as in spring or summer, though the results of his operations are less manifest. In soft rich soils, where the worms are among the roots of the turf, the mole, as may be often noticed, drives very superficial runs in the pursuit of them, these runs are to be seen where a thin layer of richly manured soil overlays a stratum of gravel; in fact, the depth of these alleys is always determined by the quality of the soil and consequent situation of the worms. With respect to the nest of the female, it is generally constructed at a distance from the fortress, where, at some convenient part, three or four passages intersect each other; this point of convergence is enlarged and rendered commodious, and fitted to receive a bed made of dry herbage, fibrous roots, &c. The chamber is generally beneath a large hillock, but not always, and the surrounding soil is usually such as to afford abundant food to the female with little trouble on her part. The mole breeds in the spring, mostly in April, and brings forth four or five young at a birth. These are supposed to remain under the mother's care till about half grown, when they commence an independent existence.

Such is the constitution of the mole that a short fast proves fatal. It would appear that all its animal appetites are in excess, its hunger is voracity amounting to rage, under the influence of which it fastens on its prey with intense eagerness. Earthworms are its favourite food, and these it skins with great address, squeezing out the earthy contents of the body before swallowing it. It is not, however, exclusively upon earthworms and the larvæ of insects that the mole feeds, during the months of June and July it is in the habit of leaving its runs under the turf, and of wandering during the night (and occasionally even during the day) on the surface, in quest of prey, such as birds, mice, frogs, lizards, snails, &c., but it refuses to touch the toad, in consequence no doubt of the acrid exudation from that reptile's skin. During these nocturnal excursions it often falls a prey to the owl, and we have seen it in the day-time caught and killed by dogs.

The voracity of the mole and its perpetually recurring repasts upon animal food render water not only a welcome refreshment, but necessary to its existence. A run, sometimes used by many individuals, always leads to a ditch, stream, or pond, if such be within a moderate distance. If these natural supplies be not at hand, the mole sinks little wells, in the shape of perpendicular shafts, which become filled with the rain, and retain the water, and they have sometimes been found brimfull. Scarcity of water, or a drought, as well as a scarcity of worms, often obliges the mole to shift its quarters, and locate upon other grounds. In its migration it will cross brooks or rivers, swimming admirably, and when spring or autumn floods inundate the fields, it easily saves itself by these means. It is moreover affirmed that in this peril the male and female brave the waters together, and expose themselves to the utmost danger in order to save their young, in which office of parental devotion they mutually assist and protect each other.

The disposition of this animal is fierce and combative. If several moles be kept in a box of earth, and not supplied with an abundance of food, they attack each other, and the weaker falls a prey to the stronger, when the mole seizes, it holds like a bull dog, with a tenacious gripe, and is not easily disengaged. M Geoffroy St. Hilaire describes the manner in which the mole approaches and seizes a bird: it exerts several stratagems to get within reach of its victim, employing the utmost address and caution, but when this is accomplished, it suddenly changes its plan, and makes an instantaneous and impetuous attack, fastens on the hapless bird, tears open the abdomen, thrusts its snout among the viscera, and revels in its sanguinary repast. After satiating its ravenous appetite, it sinks into a profound repose: in the winter it slumbers in its fortress, but in the summer, beneath some ordinary mole hill in one of its alleys. This sleep endures for about four hours, or perhaps longer, in the middle of the day, when it awakes with a renovated appetite. Its busiest time is in the evening, during the night, and early in the morning. It might be supposed from the figure of the mole that its motions were very slow and deliberate; it trips along, however, at a fair pace, and traverses its underground runs and galleries with great rapidity.

The mole does not exist in the extreme north of Scotland, in Zetland, or the Orkney Islands, nor has it been seen in any part of Ireland.

Varieties of this animal often occur: we have examined specimens of a mouse-colour, of a white, cream-white, and pale yellowish orange.

1057, 1058.—The Cape Chrysochlore

(*Chrysochloris Capensis*). The Mole is represented in Africa by the Chrysochlore, but the fore-paws are only armed with three nails, of which the outermost is long, thick, arched, and pointed; there is no tail. This singular animal is less than a mole, and appears to be entirely destitute of eyes. Its velvety fur has a metallic lustre, changing from dark green to bronze or copper in different lights. This species is a native of Southern Africa, where it lives like the mole in burrows, and feeds on worms and insects. It is the Taupe dorée of the French. A second species, the Rufous Chrysochlore (Ch. Hottentota), has been discovered by Dr. A. Smith.

1059.—The Thick-tailed Condylure, or Star-nosed Mole

(*Condylura Macroura*). The Condylures, or star-nosed moles, are confined to North America; they closely resemble the common mole in their feet, general aspect, and habits, but the tail is longer, and the disc at the end of the snout is encircled by little moveable cartilaginous processes like the rays of a star. The eyes are extremely minute, external ears are wanting; fur deep, thick and fine. The teeth consist of incisors, $\frac{2}{4}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{8-8}{7-7}$. (See Fig. 1060, teeth of C. cristata.)

We have no minute details respecting the manners and instincts of the Chrysochlores, of which three species are distinguished: they are burrowing animals, feeding upon worms and the larvæ of insects, &c. The thick-tailed Condylure was discovered by Mr. David Douglas on the banks of the Columbia River. The colour of the fur above is deep lustrous brown, paler on the under parts. The tail is contracted at its root, whence it gradually enlarges, and then tapers to a fine point. Length of head and body, four inches and a half, of the tail, two inches and a half.

1061.—The Hedgehog

(*Erinaceus Europæus*). Riccio of the Italians, Erizo of the Spanish; Ouriço of the Portuguese; Hérisson of the French; Igel of the Germans; Eegelvarken of the Dutch; Pin-suin of the Danes; Draenog and Draen y coed of the ancient British, Urchin, Provincial English, Ἐχῖνος of the Greeks. It is superfluous to enter into an elaborate description of this spine-covered animal; all are well acquainted with its external characters, and all know that it has the power of rolling itself up into a ball, presenting an array of serried spines formidable to its antagonist. A peculiar muscular expansion beneath the skin enables the hedgehog thus completely to enshroud itself in its panoply, as in a hood, the margin of which is closed by means of a circular muscle, the head and limbs being retracted within. While the animal is thus enveloped in its armed skin, the spines are stiffly set by the action of the muscular expansion, and radiate from the ball: and such is the strength and elasticity of this covering, that a hedgehog may roll down a steep place or precipitous bank without the slightest injury. Mr. Bell assures us that he has repeatedly seen a domesticated hedgehog in his possession run towards the precipitous wall of an area, and without hesitation or a moment's pause for preparation throw itself off, contracting at the same instant into a ball, in which condition it reached the ground from a height of twelve or fourteen feet, when, after a few moments, it would unfold itself and run off unhurt. The hedgehog is nocturnal in its habits: it frequents woods, copses, old gardens, orchards, and thick hedgerows where it remains rolled up in its retreat during the day, coming forth on the approach of twilight, and continuing on the alert till morning. Its motions are quick and irregular, and its pace a sort of heavy paddling, the body being close to the ground, and the feet plantigrade. Its food consists of insects, slugs, frogs, toads, mice, and even snakes; to which it adds eggs, young nestlings, and various kinds of vegetables, as the roots of grass and plantain, and ripe orchard-fruits which fall from the trees. White notices the manner in which it bores with its snout, to get at the root of the plantain, which it eats, saving the tuft of leaves untouched. In the first volume of the 'Zoological Journal' is the narrative, from the pen of Mr. Broderip, of an experiment made by Professor Buckland, relative to the destruction of snakes by the hedgehog, from which it would appear that the cunning quadruped makes a sudden attack on the reptile, and giving it a hard bite, instantly rolls itself up for safety, then cautiously unfolds, and inflicts another wound, repeating its attacks till the snake is "scotched," its back-bone being broken in several places; it next passes the body of the snake gradually through its jaws, cracking the bones at short intervals, which done, it proceeds to eat its victim as one would eat a radish, beginning with the tip of the tail, and slowly proceeding upwards. We have frequently seen hedgehogs eat frogs, rapidly crunching their bones with an audible noise. The hedgehog may be easily domesticated, and becomes familiar, feeding on soaked bread, vegetables, and meat, it is useful in kitchens, which it effectually clears of crickets, cockroaches, beetles, &c., and as it keeps quiet in its nest or retreat all day, produces itself no inconvenience. Superstitious ignorance, as in the case of the poor little shrew, has led to the cruel persecution of the hedgehog, because, forsooth, it was (and in some places still is) believed to drain dry the udders of the cows during the night, to the surprise of the milkmaid and the indignation of the farmer. To the Slow-worm and the Fern-owl (Caprimulgus) the same mischievous habits have also been attributed, the physical impossibility of their committing such a theft being overlooked or not appreciated. With respect to the hedgehog, this accusation, as Mr. Bell observes, is about as well founded as that by Pliny, and exaggerated by Sperling, who asserts that it ascends trees, knocks off the apples and pears (Ælian says figs), and throwing itself down upon them so that they may stick to its spines, trots off with the prize.

The hedgehog hybernates, passing the winter in a state of complete torpidity. It makes its retreat in banks under the hollow roots of trees, in holes or other sheltered and convenient places, constructing a sort of nest or bed of grasses, dried leaves, and moss, with these it covers itself deeply and closely, and when discovered hybernating resembles a ball or roundish mass of herbage, which it seems to have attached to its spines by repeatedly rolling itself round amidst the heap it had stored up.

The female breeds early in the summer, forming an artful nest, roofed so as to throw off the rain, within, it is well lined with leaves and moss. The young, from two to four in number, are blind at their birth, about two inches long, perfectly white, and naked, though the rudiments of the prickles are perceptible. These soon develop themselves, and harden even before the eyes are opened, but it is not till a later period that the young are able to draw down the skin over the muzzle, and fold themselves into a complete ball. The mother is devoted to her offspring, and unremitting in her duties. Formerly the flesh of the hedgehog was eaten in our island, and is so still on some parts of the Continent. An intimate friend of the writer had one dressed and served up for dinner, and assured us that it was excellent, we must, however, remember the old adage "De gustibus," &c. few, we think, would willingly partake of such "small deer." The Romans made use of the spiny skin of the hedgehog in hackling hemp for the weaving of cloth.

The hedgehog is found in most parts of Europe, its length, when full grown, is about nine inches and a half. Fig. 1062 represents the skull. The dentition is as follows:—Incisors, $\frac{6}{6}$, the two middle the longest, false molars, $\frac{3-3}{3-3}$; molars with acute tubercles, $\frac{3-3}{3-3}$; small tuberculous molars, $\frac{1-1}{1-1}$.

Closely allied to the genus Erinaceus is the genus Centetes Ill. (Centenes, Desm., Setiger, Geoff.), which comprehends certain hedgehog-like animals, confined, as far as we know, to the Mauritius and Madagascar. They are covered with spines, but these spines are feebler than those of the hedgehog nor do the animals enjoy so completely the power of rolling themselves up into a ball. They differ moreover in their dentition, the incisors being $\frac{6}{6}$ or $\frac{4}{4}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{6-6}{6-6}$. See Fig. 1063. The muzzle is long and pointed, the tail wanting. These animals hybernate during the dry season, when their natural food, insects and worms, fail, and revive on the return of the rainy season. In their habits they are nocturnal.

1064.—The Tenrec, or Tanrec

(*Centetes ecaudatus*, Cuv.; Erinaceus ecaudatus, Linn.). This species exceeds our hedgehog in size, and is covered above with long flexible spines except on the top of the head; the under parts are clad with yellowish bristly hairs, a few black ones being intermixed.

The Tenrec is a native of Madagascar, but has been naturalized in the Mauritius. Of its habits we have but imperfect details. On June 14, 1831, a letter respecting these animals, addressed to the Zoological Society, and dated Port Louis, December 15, 1830, was read at the scientific meeting. It referred to previous unsuccessful attempts on the part of the Society's valuable correspondent to transport from the Mauritius to England living Gouramies and Tanrecs, and promised a repetition of the experiment. Mr. Telfair states that he has now a pair of living Tanrecs, fully grown, ready to send to England when he can place them under proper care. "They live on boiled rice, but will probably not exist long upon that alone, as their natural food is chiefly composed of worms, insects, lizards, and the eggs of snails, of which it would be difficult to carry a sufficient supply in a living state on board ship. Fresh supplies might, however, be obtained at Madagascar or the Cape of Good Hope, at St. Helena, Ascension, and the Cape de Verd Islands, and the animals might thus arrive in good health in England, where they would probably survive for some time, burrowing under a dungheap, or living in straw in a hothouse or greenhouse. An opportunity would thus be furnished of observing their habits. In the Mauritius they sleep through the greater part of the winter, from April to November, and are only to be found when summer heat is felt, which being generally ushered in by an electric state of the atmosphere, the negroes (with whom they are a favourite food) say they are awakened by the peals of thunder which precede the summer storms or "pluies d'orage." Even in summer they are not often seen beyond the holes in which they burrow, except at night. Their favourite haunts are among the old roots of clumps of bamboos. They have a very overpowering smell of musk at all times, which is increased to an extraordinary degree when they are disturbed or frightened, yet their flesh is considered so savoury by the negroes, that they are unwilling to sell those which they catch, and would not exchange it for any other food, except perhaps for the "ourite," which is the catfish hung up in the sun until it acquires a most fetid smell, tainting the atmosphere to a great distance, in this state it is a chief ingredient in their favourite ragout."

1065.—The Striped Tenrec

(*Centetes semispinosus*). This species is of small size: the head is very conical, the muzzle elongated and pointed, the body is clothed with a mixture of spines and bristles, and is banded longitudinally yellow and black. Native country, Madagascar.

1066.—The Spiny Tenrec, or Tendrac

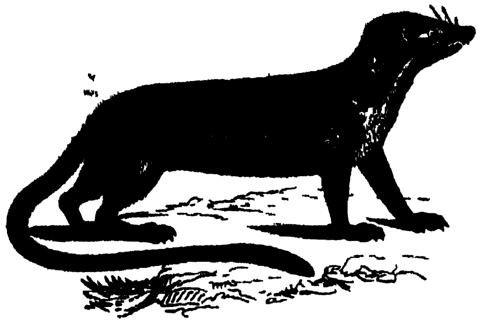
(*Centetes spinosus*), Ericulus nigrescens? of Isidore Geoffroy. Incisors, $\frac{4}{4}$, molars, $\frac{7-7}{7-7}$.

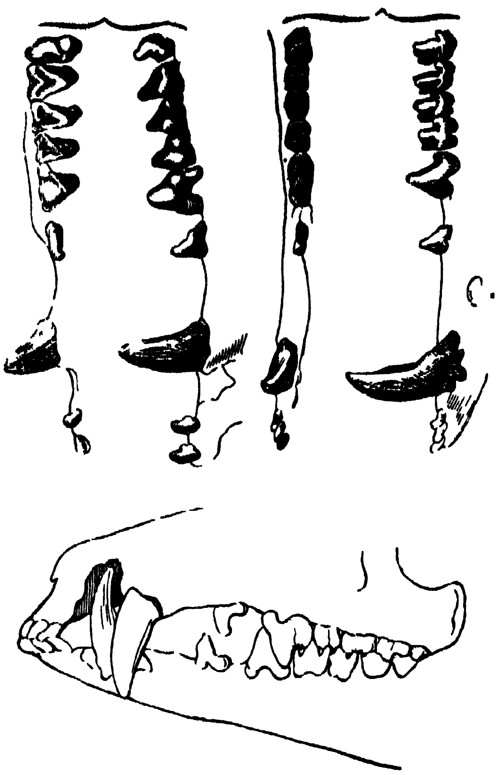
The tendrac of Buffon is more like a hedgehog in appearance than are the two previous species. It is covered above with close, short, stiff spines, and with bristle like hairs on the under parts. The spines are of a deep mahogany colour, whitish at the root and point. Under parts yellowish-white. Native country, Madagascar, where it is said to make a burrow in the neighbourhood of fresh or salt water, its habits resemble those of the rest of its race, and it is acceptable to the negroes as food.

An insectivorous animal allied to the Tendrac, and called Sokinah at Madagascar, will be found described and figured under the name of Echinops Telfairi, Martin, in the 'Trans. Zool. Soc.,' vol. ii., p. 249, and characterised in the 'Zool. Proceeds.,' 1838, p. 17. Of its habits and manners no accounts have been obtained, but from the rigidness of the spines, and the development of the muscular subcutaneous expansion (Panniculus carnosus), it appears probable that this animal has, like the hedgehog, the power of rolling itself up into a ball, which is not the case with the tenrec.

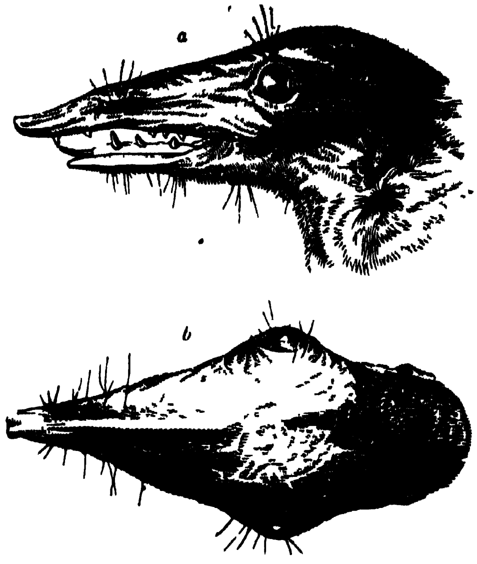
1067.—The Gymnure

(*Gymnura Rafflesii*). Of the genus Gymnura (Horsfield and Vigors) one species only is at present recognised. It is a native of Sumatra, and its introduction to science is due to the late Sir T. Stamford Raffles, who first described it under the title of Viverra Gymnura. Cuvier observes that it appears to approach Cladobates (Tupaia) in its teeth, and the shrews in its muzzle and scaly tail. The toes are five in number on each foot; the eyes are small, the whiskers long; the fur consists of a short dense woolly undercoat, and long coarse thinly-set hairs. The body, legs, first half of the tail, and a stripe


1068.—Banxring.

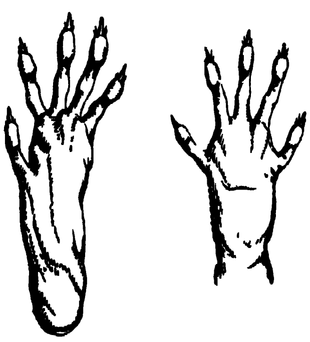


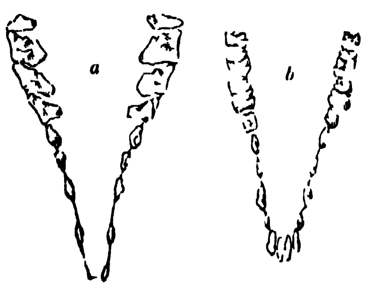
1063.—Teeth of Tenrec.



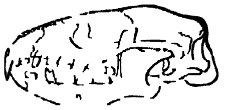
1070.—Head of Tupaia Tana.

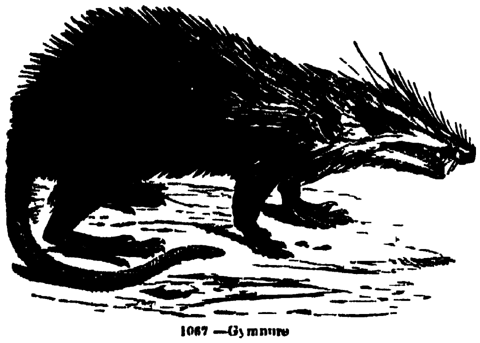
1071. Head of Banxring.

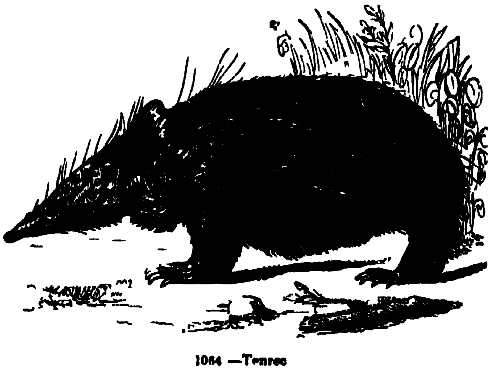

1072.—Feet of Banxring.

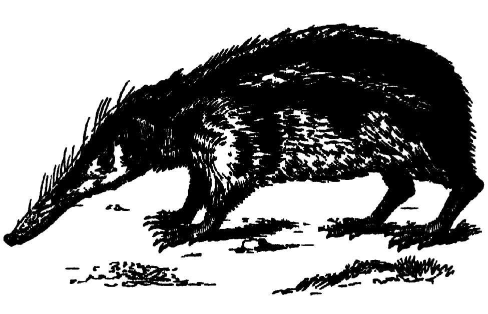


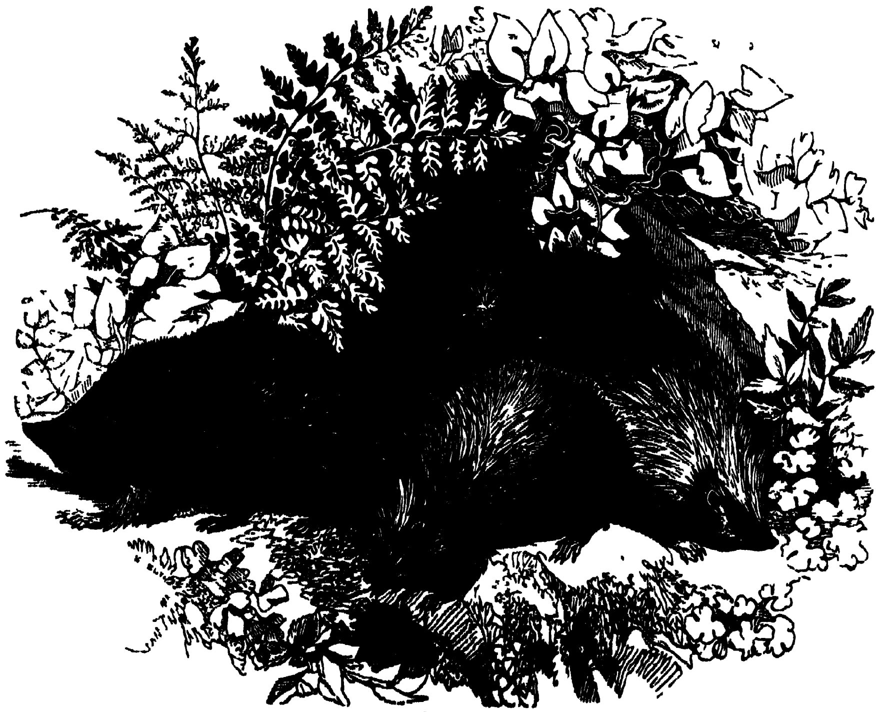
1069.—Teeth of Banxring.

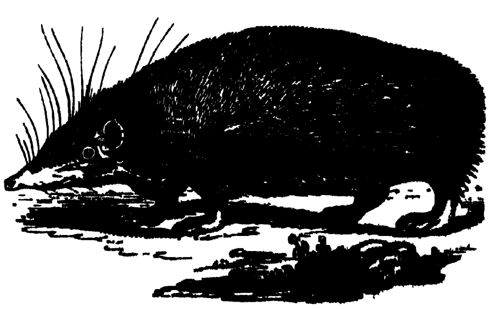

1062.—Skull of Hedgehog.

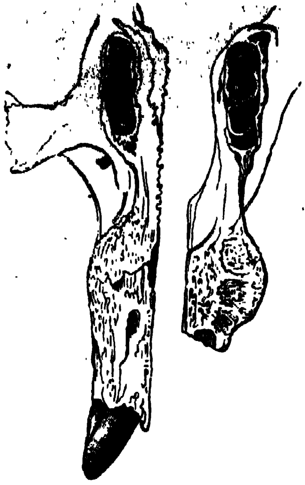

1067.—Gymnure.


1064.—Tenrec.

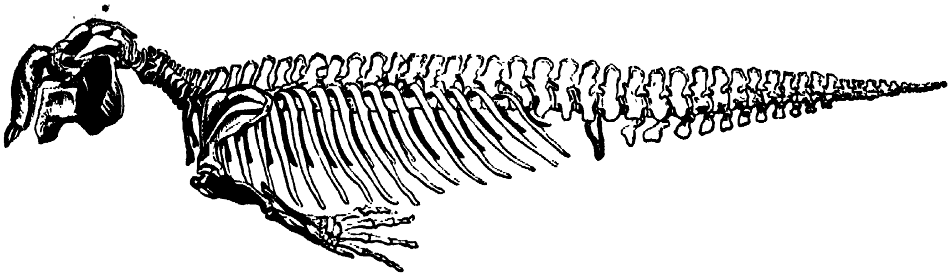

1065.—Striped Tenrec.


1061.—Hedgehogs.

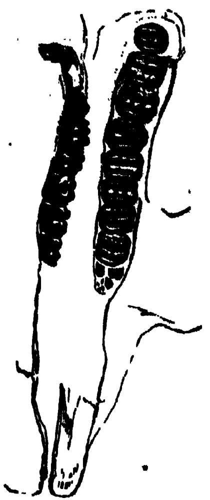

1066.—Spiny Tenrec.



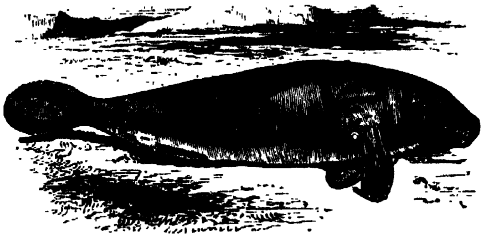
1080 Teeth of Dugong.



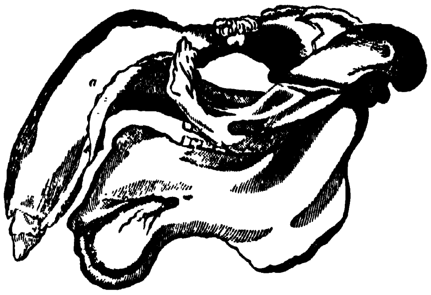
1074.—Skeleton of Dugong.



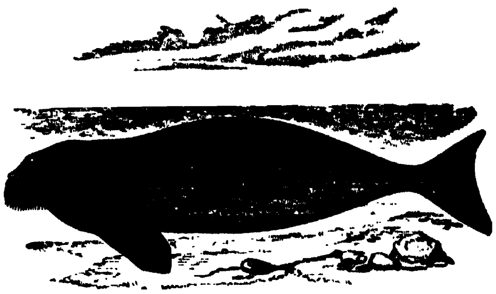
1079.—Teeth of Mana

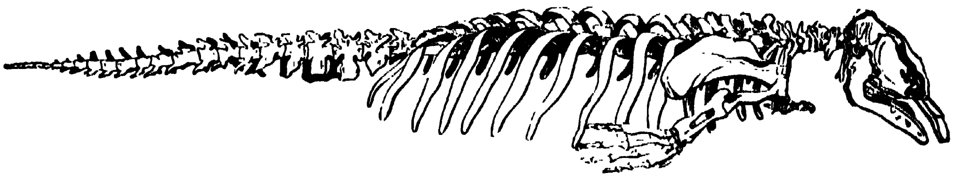


1082 —Manatee.

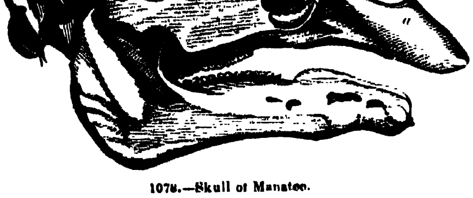


1077.—Skull of Dugong.

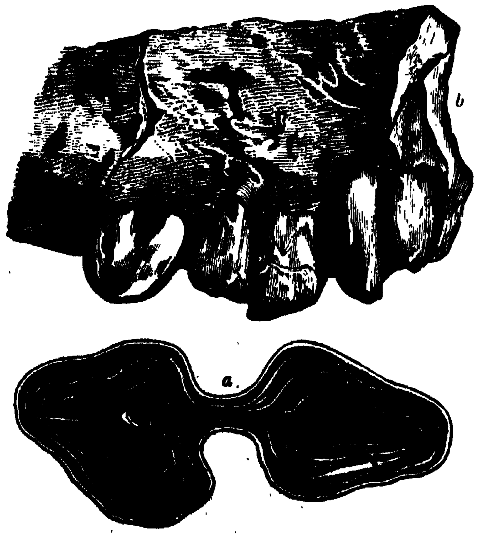




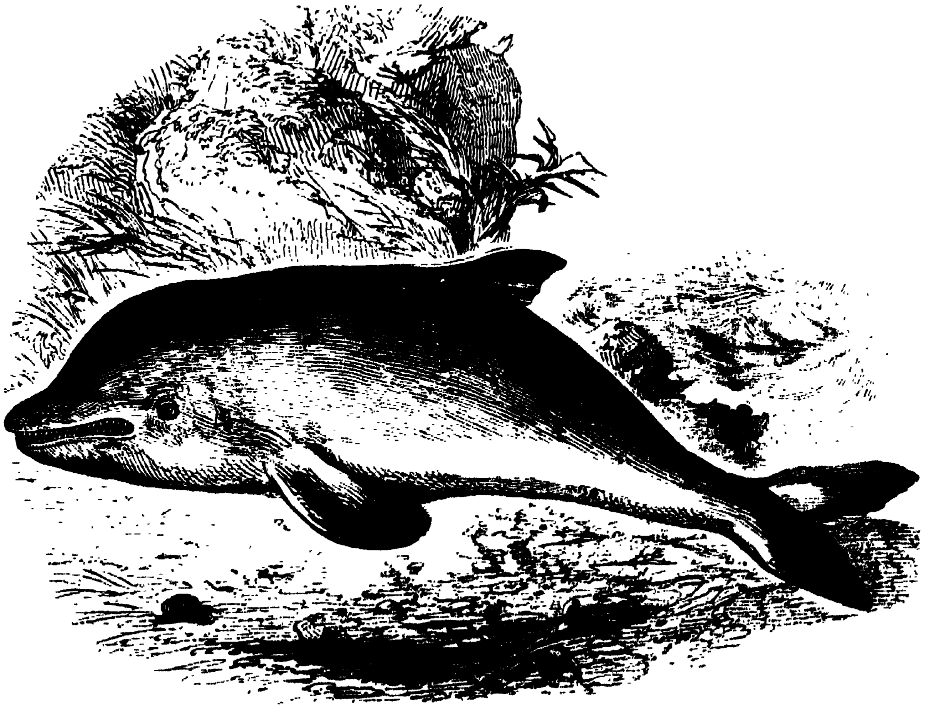
1075.—Skeleton of Manatee.



1078.—Skull of Manatee.



1083.—Fossil Teeth of Zeuglodon.



1086.—Comm

above the eyes are black; the head, neck, and end of the tail are white; the muzzle is elongated. The dentition as follows:—Incisors, $\frac{6}{6}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{6-6}{6-6}$. Of its habits nothing definite is known. It exhales a strong musky smell. Specimens are preserved in the Museum of the Zoological Society.

1068.—The Banxring

(*Tupaia Javanica*). The genus Tupaia, Raffles (Cladobates, F. Cuvier; Sorexglis, Diard; Glissorex, Desmarest; Hyogale, Temminck), contains about three species, natives of Sumatra and Java, where they inhabit the forests. In their dentition there is some resemblance to that of the hedgehog. The formula stands as follows:—Incisors, $\frac{2}{6}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{6-6}{6-6}$. Fig. 1069 represents the teeth: *a*, those of the upper jaw; *b*, those of the lower. The head is oblong and depressed; the snout long and attenuated; the nostrils lateral; the eyes very large and rather prominent; the body long, slender, and covered with close fur and soft hairs; the tail is longer than the body, and compressed; the feet plantigrade and pentadactyle; the toes compressed and furnished with hooked claws; the thumb is distinct, and moveable in a direction opposite to the others. Fig. 1070 represents the head of the Tupaia Tana of Sumatra: *a*, in profile; and *b*, as seen from above. Fig. 1071 represents the head of the Banxring (Tupaia Javanica): and Fig. 1072; *a*, the fore-foot; *b*, the hind-foot; in both the thumb is seen distinct, especially in the hind foot.

Dr. Horsfield (' Zoological Researches in Java ') states that in the Malayan language the name of Tupai is a general term for various small animals which have the external form and agility of the squirrel; while each different species, agreeably to the observations of the natives of the islands of the Eastern Archipelago, where these animals are found, is distinguished by a particular epithet. Thus two small animals, which, according to Dr. Horsfield's classification, belong to the genus above described, are, he says, denominated Tupai Press and Tupai Tana; while several other animals belonging to the genus Sciurus are denominated Tupai Jinjang, Tupai Tankrawa, &c. The same author states that three species of Tupaia had been discovered when he wrote, two of which are natives of Sumatra, Penang, and Singapura, while the third has been found exclusively in Java, where it is distinguished by the name of Bangsring or Sinsring.

The tupaias, instead of being strictly terrestrial, lead, to a certain extent, the life of squirrels, having all their sprightliness and activity, and much of the general appearance of those animals. They are, in fact, semi-arboreal insectivora, and were it not for their long head and pointed snout, could scarcely be distinguished, at a distance, from some of the Sciuri. Their fine soft fur is of a dark red, and on the tail the hair, which is long and bushy, is distichous, or arranged laterally, especially if viewed on the under surface. Sir T. Stamford Raffles states that they are decidedly diurnal, their large bright eyes being suited to daylight, and that they live principally on fruits, and especially that of the Kayo gadis. The Banxring or Bang-ring of Java is lively and active. Dr. Horsfield, who met with it during his researches in Java, states that in traversing the province of Blambangan, in 1806, he discovered it in the extensive forests which almost entirely cover the eastern extremity of the island; and he thinks that its range, though it may not be confined exclusively to that province, is extremely limited. From the scanty information afforded by the natives, it would seem that the bangsring lives on trees, and "feeds on fruits and nuts;" but Dr. Horsfield observes that this account must be received with due limitation, and he refers to the system of dentition as indicating that the bangsring is more adapted to animal than vegetable food. Length, from extremity of nose to the root of the tail, six inches five lines; of tail, six inches five lines.

The fur of the bangsring is close, silky, and delicate, with a few longer, more rigid, and darker-coloured hairs dispersed throughout it. The upper parts are brown, slightly diversified with grey of different shades; the lower parts dirty white, with a slight tint of greyish: the tail agrees with the upper parts; and the scapular line, which is nearly an inch long, agrees with the neck.

The Ferruginous Tupaia is a native of Sumatra, and does not appear to differ essentially in its habits from the Java species. Sir Stamford Raffles states that a tame Tupaia ferruginea was suffered to go about at perfect liberty, ranged in freedom over the whole house, and never failed to present himself on the breakfast and dinner table, where he partook of fruit and milk. Dr. Horsfield also quotes an extract from the ' Proceedings of the Asiatic Society,' where it is stated that a living Tupaia ferruginea was brought to Bengal by a medical gentleman; it ran about the house tame, but would not allow itself to be caught for close inspection. Though at liberty to run out of doors whenever it liked, it showed no disposition to leave its quarters, and evinced some attachment to the family; for whenever strangers entered the house it showed disquietude and made a chattering noise. It gave no trouble in feeding, for it was always on the search after insects, and its favourite food seemed to be flies, crickets, grasshoppers, and cockroaches. Specimens of the three species are preserved in the Museum of the Zoological Society.

Tribe—AQUATIC PACHYDERMATA

(The *Herbivorous Cetacea* of Cuvier).—If our reader will turn to our account of the fossil Dinotherium and Toxodon, p. 111, he will find that we have there alluded to the Dugong or Duvong, and the Lamantin (the Aquatic Gravigrades of Blainville), as belonging to the Pachydermatous order, and as having in manners and organization little relationship to the true whales, excepting in so far as they are alike modified for the waters of the deep.

In their external form, indeed, these aquatic pachyderms are whale-like: there are no hinder limbs, the pelvis being either rudimentary or wanting, and the fore-limbs are converted into flippers or paddles; the body is continued conical till it terminates in a transverse or horizontal tail, consisting of an expanse of cartilage covered with tendinous fibres and skin, and which is the chief organ of aquatic locomotion. The skin is almost naked, oily, and covers a layer of subcutaneous blubber or fat; the lips are studded with thick wiry bristles. Although the nasal opening is placed high on the skull, the nostrils in the skin are placed at the extremity of the muzzle, which is remarkably obtuse and truncate—a form advantageous for the browsing habits of these animals, which feed on submarine vegetables. The eyes are protected by a membrana nictitans, and the teats in the females are situated just behind the roots of the flippers—two points of difference between these aquatics and the whales. The stomach is sacculated; the teeth present flat bruising surfaces; there are no intercostal and intra-vertebral arterial plexuses, as in the true Cetacea (Fig. 1073). The bones of the skeleton are of dense texture and destitute of medullary cavities; they are not loaded with oil, as in the Cetacea. In the Indian Dugong there are seven cervical vertebræ, nineteen costal vertebræ, and thirty lumbar, pelvic, and caudal. In the Dugong of the Red Sea these latter vertebræ amount to thirty-three; making in all fifty-nine. The number of the ribs is nineteen on each side. The lower jaw is articulated to the cranium by a true synovial capsule, reflected over cartilaginous surfaces, and not, as in the true Cetacea, by a coarse, oily, ligamentous substance. In the Lamantin or Manatee, the ribs are sixteen on each side. Fig. 1074 represents the skeleton of the Dugong, and Fig. 1075 that of the Manatee. They may be compared together, and with the skeleton of the Porpoise, Fig. 1076 (a true cetacean), with advantage.

Fig. 1077 represents the skull of the Dugong; Fig. 107-, that of the Manatee. The skull of the manatee may be distinguished from that of the dugong by the following particulars:—The nasal bones are very small, and imbedded, so to speak, in the frontal, which consist of two portions advancing forwards, so as to enter into the upper margin of the nasal orifice, and form the ceiling of the orbits. The intermaxillary bones (*a*) advance far forwards, but are destitute of teeth, excepting during the early stages of the animal's existence; these bones form the lateral edges of the nasal orifice, which is very spacious; but in the living animal the bones are continued by a cartilaginous addition, so that the nostrils open at the end of the muzzle. The orbits are situated far forwards, and their margin is very prominent; the zygomatic arch is broad and strong; the muzzle advances directly forwards with a very slight gradual downward bend. The dentition of the manatee (Fig. 1079) is not correctly ascertained. In adult skulls eight molars on each side are usually found, in others nine or ten; and Fred Cuvier observes that, as in some of the ordinary Pachydermata, the anterior molars, worn the first, fall as the posterior ones become developed, being, indeed, pushed out by their advance.

The skull of the dugong (Fig. 1077) is distinguished by the enormous size of the intermaxillary bones, *a*, which extend backwards as far as the middle of the temporal fossæ, and are bent down with a sudden angle (reminding us of the beak of the flamingo) over the elongated symphysis of the lower jaw. In this deflected portion of each intermaxillary bone is lodged the root of a permanent, tusk-like, but not very prominent incisor, there being two of these teeth above, none below. This development and shape of the intermaxillary bones throws the nasal orifice higher up than in the manatee; the lower jaw is thicker, shorter, deeper, and its symphysis fits the deflected portion of the intermaxillary bones In the young dugong the molars are five on each side, above and below; but the three anterior are deciduous, the two last being permanent (see dentition, Fig. 1080). To those who wish to investigate the anatomy of this animal we recommend a paper by Professor Owen, in the 'Zool. Proceeds.' for 1838, p. 28.

1081.—The Dugong

(*Halicore Dugong*, F. Cuv.); Halicore Indicus, Desmarest. This species is a native of the Indian seas, being common among the islands of the Indian Archipelago, and visiting also the coasts of New Holland. Its favourite haunts are the mouths of rivers and straits between proximate islands, where the depth of water is but trifling (three or four fathoms), and where, at the bottom, grows a luxuriant pasturage of submarine algæ and fuci: here in calm weather may small troops be seen feeding below the surface, and every now and then rising to take breath. The position of the mouth, the muscular powers and mobility of the lips garnished with wiry bristles, and the short incisor tusks of the upper jaw, enable these animals to seize and drag up the long fronds of the subaquatic vegetables which constitute their nourishment.

The dugong is in high esteem as an article of food, its flesh being tender and not unlike beef; hence it is hunted assiduously by the Malays, who attack the animal with harpoons, in the management of which they are very dexterous.

The mutual affection of the male and female is very great, and the latter is devoted to her offspring. If a dugong be killed, the survivor of the pair, careless of danger, follows after the boat, carrying the body, impelled by an overmastering passion, and thus often shares the fate of its partner; indeed, if one be taken, the other is an easy prize.

The dugong attains to the length of seven or eight feet; its caudal paddle is crescent-shaped; the large thick upper lip hangs over the lower; the skin of the body is thinly set, with very short prickly bristles; the anterior limbs, or flippers, are destitute of nails. The ventricles of the heart are not united together, but form as it were two distinct hearts joined at the top: this separation of the ventricles does not alter the routine of the circulation. The eyes are very small.

An allied species (Halicore Tabernaculi) has been discovered by MM. Ehrenberg and Rüppell in the Red Sea.

1082.—The Manatee, or Lamantin

(*Manatus Americanus*; *Trichecus Manatus*, Linn.). The American manatee inhabits the embouchure of the Amazon, Orinoko, and other rivers of South America, and feeds upon subaquatic herbage. Its flippers exhibit rudiments of nails, and by their aid it sometimes drags its unwieldy body on shore, and crawls up the banks, either to bask in the sun or seek for terrestrial vegetables. The males and females are mutually attached to each other, and the latter are tenderly devoted to their young, which soon after birth they carry under their flippers where the teats are seated. This species measures from six to seven feet in length; the head is small, the muzzle thick and fleshy, presenting at its extremity a semicircular disc, at the upper part of which are the nostrils, semicircular orifices, directed forwards. The eyes are small; the aperture of the auditory canal almost imperceptible. From the shoulders the body gradually diminishes, and terminates in a flat, horizontal, oval paddle.

A distinct species (Manatus Senegalensis, Desm.) is found in the embouchure of the Senegal and other rivers of Western Africa; its manners resemble those of the preceding, but we have no very precise details.

According to Dr. Harlan, a distinct species of manatee, which he terms Manatus latirostris, inhabits the shores of some parts of North America.

1083.—Zeuglodon.

The fossil teeth here represented were discovered by Dr. Harlan in America, and attributed by him to an extinct reptile, which he termed Basilosaurus. Professor Owen, however, proves them to belong to an extinct animal referable to the present tribe, and allied to the manatee and dugong: and for this animal he has proposed the name of Zeuglodon, a word suggested by the form of the posterior molars, which resemble two teeth tied or yoked together. *a*, represents the cut surface of one of these teeth, each part exhibiting a central pulp cavity, and concentric striæ of growth. For minute details see 'Mag. Nat. Hist.' May, 1839, p. 209.

ORDER CETACEA.

The Cetacea are characterised by the conical fish-like form of the body covered with a smooth naked skin, adapted for the medium in which they live; between the skin and the muscles is a layer of blubber, varying in thickness in different species, and most abundant in the Greenland whale, its thickness being from eight or ten to twenty inches. The uses of this layer are various:—in the first place it renders the huge body of these animals specifically lighter than the surrounding fluid; secondly, it materially tends to the preservation of the vital heat; and, thirdly, it affords protection to the internal organs against the effects of the enormous pressure to which these animals are subject while plunging deep into the abysses of the ocean. The fore-limbs are modified into flippers, and the posterior part of the body, destitute of hind limbs, is continued conical, and terminates in a broad horizontal cartilaginous paddle. On the central line of the upper surface, and generally towards the tail, is sometimes seated a small vertical cartilaginous fin, unconnected with the skeleton. This fin varies in figure, and is often absent. It is partly by the aid of this fin, where present, but more so by that of the flippers, that the cetacea balance themselves in the water, for when dead or dying they float on the side or the back. The mode of progression consists of a series of leaps or impulses produced by the action of the tail, which is bent down and then struck out with greater or less violence, according to the rapidity with which the animal is cleaving its way. By means of this organ it can dive instantaneously, or even leap out of the water, throwing the waves around into spray and foam. In the ordinary position of the cetacea while floating, only the top of the head and part of the back appear above the surface, their capacious jaws, and also the eyes, being beneath; hence, in order to admit of uninterrupted respiration, the situation and structure of the nostrils are modified accordingly.

These animals are called blowing cetacea, because, in consequence of the structure of the nostrils, they are capable of throwing up jets of water or spray accompanied with a loud noise, this act is termed blowing, and the nasal orifices blow-holes or spiracles; they open on the top of the head, and lead to two large membranous pouches seated immediately below the integument. These pouches are receptacles for fluid, which, being forced up into them, is prevented from returning into the throat by certain valves furnished with strong muscles lodged above the intermaxillary bones, see Fig. 1084, the skull of the Dolphin: it is in the hollow at the top of the head that these pouches are placed The posterior nasal passage is furnished with longitudinal and circular muscular fibres, and opens into the pharynx or back part of the mouth, and into it the larynx rises in the form of a pyramid, and the circular fibres of the nasal passage have the power of grasping it by their contractions. The channel, therefore, from the larynx through the posterior nasal passage into the pouches is plain. Now these pouches are lodged, as we have said, beneath the skin, and the nostrils which conduct to them open externally by a transverse semilunar slit, while very strong muscular fibres, radiating from the entire circumference of the cranium, cover the whole surface of the apparatus, and act as compressors of the pouches Let us suppose, says Cuvier, "that the cetaceous animal has taken into its mouth some water which it wishes to eject; it moves its tongue and jaws as if it were about to swallow, but, closing the pharynx, it forces the water to mount into the nasal passage, where its progress is accelerated by the action of the circular fibres, until it raises the valves and distends the membranous pouches above. Here it can be retained until the animal wishes to eject it, and take in breath. In order to spout, the valves being closed, it forcibly compresses the pouches by means of the muscular expansions which cover them; and compelled to escape by the narrow crescentic aperture, it is projected to a height corresponding to the force of the pressure." The noise, however, called blowing, shows that the animal forcibly exhausts its lungs of the pent-up breath, driving the air through the nasal orifices which, mingled with the water contained in the pouches, rises like spray or dense mist. Fig. 1085 represents a section of the head of the porpoise, showing the structure of the nasal apparatus. This apparatus is of little use as an olfactory organ, the sense of smell being very deficient. As respects the organs of sight we may observe that the eye is very small, and adapted, as in fishes, to the density of the surrounding medium, the cornea being flat, and the crystalline lens globular; there is no lachrymal gland, but the lids are furnished with certain little glands secreting a fluid adapted for lubricating the eye-ball. The external aperture of the ear is minute and capable of being closed at pleasure. Under water the whale hears the smallest sounds, the slightest splash of the oar, but to sounds in the air above, even the report of a cannon, as Scoresby states, it is insensible. Its auditory apparatus, enclosed in a bone (petrous portion of the temple) remarkable for hardness, appreciates only the vibration of water. The sense of taste does not appear to be acute.

The cetacea, passing their existence in the wild waste of seas, are capable of remaining submerged for a considerable length of time, and the vascular system is modified accordingly, the arteries not only of the limbs, but of the chest and vertebral canal, being singularly plexiform The discovery of this arrangement is due to the celebrated W. Hunter, who published an account of it in the Phil. Trans., 1787. These animals, he says, "have a greater proportion of blood than any other known, and there are many arteries apparently intended as reservoirs where a larger quantity seemed to be required in a part, and vascularity could not be the only object. Thus we find that the intercostal arteries divide into a vast number of branches, which run in a serpentine course beneath the pleura (lining membrane of the chest), the ribs, and their muscles," forming a deep maze of intermingled and contorted tubes. "These vessels everywhere lining the sides of the thorax pass in between the ribs near their articulation, and also behind the ligamentous attachment of the ribs and anastomose with each other. The spinal cord is surrounded with a net-work of arteries in the same manner, more especially where it comes out from the brain, and where a thick substance is formed by their ramifications and convolutions, Fig. 1073 represents the arrangement of the arteries of the chest.

Nor is this plexiform arrangement peculiar to the arterial system, it is even more strongly displayed in the venous: the veins in certain parts forming immense plexiform reservoirs. This curious disposition of the vascular system in the cetacea is, as we have intimated, most probably connected with their habits of diving, during which their respiration is suspended, and consequently the passage of the blood through the lungs impeded, while at the same time they are subjected to a great pressure Hence perhaps the arterial plexuses are needed as reservoirs stored with oxygenated blood for the use of the system, while the venous plexuses are reservoirs for the sake of safety during the suspension of respiration

The females of this order have two teats deeply imbedded at the lower portion of the abdomen The stomach is very complicated, divided into several compartments, and digestion is very rapid.

As these animals have to plough the waves head foremost, a long or even decided neck would interfere with their movements, consequently the cervical vertebræ are compressed into a small space, and more or less entirely anchylosed into one mass, to the total immobility of the head, the axis of which cannot be altered without a corresponding alteration of that of the body It is moreover remarkable that the two halves of the head do not precisely correspond in symmetry. This is especially observable in the dolphins, porpoises, grampus, and cachalot. (See Meckel's Anatomie Comparée, vol iv p 361)

The cetacea are all carnivorous, but their prey differs from the small mollusk to fishes and even the smaller of their own order, and their teeth are modified accordingly They are divided into the following families:—

1 *Delphinidæ*, Dolphins, Grampuses, Narwhals, &c. 2. *Catodontidæ*, Cachalots or Spermaceti Whales. 3. *Balænidæ*, Rorquals and Blubber Whales.

Family Delphinidæ (Dolphins, Porpoises, &c.):—

1086, 1087.—The Common Porpoise

(*Phocæna communis*). In the genus Phocæna the snout in the living animal is not produced as in the Dolphin; but in other respects the characters are the same. The teeth are numerous, compressed, rounded, and interlock when the jaws are closed, and are well fitted for snapping at and retaining the slippery prey. (Fig 1088) A dorsal fin is present. There are several species.

The common porpoise is active, fleet, and voracious; it frequents, in troops, the bays and inlets of our coast, and especially the mouths of rivers, not unfrequently advancing to a considerable distance up their stream. In such places it is often taken in nets by the fishermen, becoming entrapped while eagerly pursuing its prey. When the shoals of herring and other fish which periodically visit our coast make their appearance, they are harassed, among other enemies, by this active and voracious animal, which revels in the luxury of a perpetual feast; and as its appetite is enormous and its digestion rapid, the slaughter in which it appears incessantly occupied must be very great. The porpoise is common at the Nore, and few have sailed to Margate or Ramsgate who have not seen these animals, tumbling along, as they appear to do, in the rushing waves. The peculiarity of their motion results from the horizontal position of the tail-paddle, and the up-and-down stroke which it gives; and their momentary appearance is for the purpose of breathing, which accomplished, they plunge down in search of their food. In former days the flesh of the porpoise was highly esteemed as a delicacy for the table, and was served at public feasts; indeed, it is but lately that it has fallen into disrepute, and been omitted at city entertainments, where the turtle usurps its place Our forefathers must have had a different notion about table delicacies from ourselves; for few, we believe, would now relish the rank, oily, fishy flesh of this animal. Length about five feet. Fig. 1076 represents the skeleton.

Fig. 1084 represents the skull of the Dolphin (Delphinus Delphis), a species celebrated by the ancients, and resembling the porpoise in its habits and food. The aquatic evolutions of these animals, as seen sporting around ships, apparently for the sake of amusement, their varied and rapid turns, and gambols, are well described by Ovid—

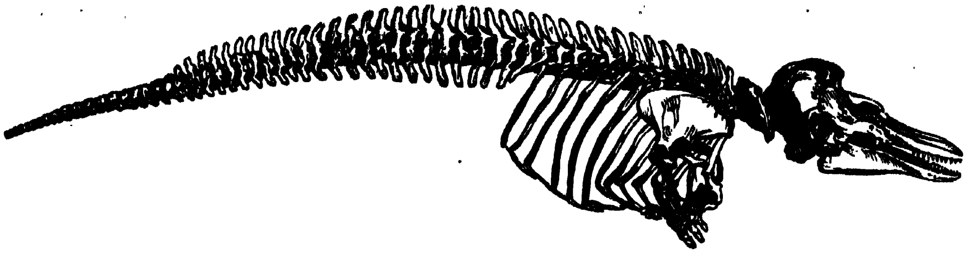
> "Undique dant saltus, multâque adspergine rorant;
> Emerguntque iterum redeuntque sub æquora rursus,
> Inque chori ludunt speciem, lasciváque jactant
> Corpora, et acceptum patulis mare naribus efflant."

1089, 1090.—The Narwhal

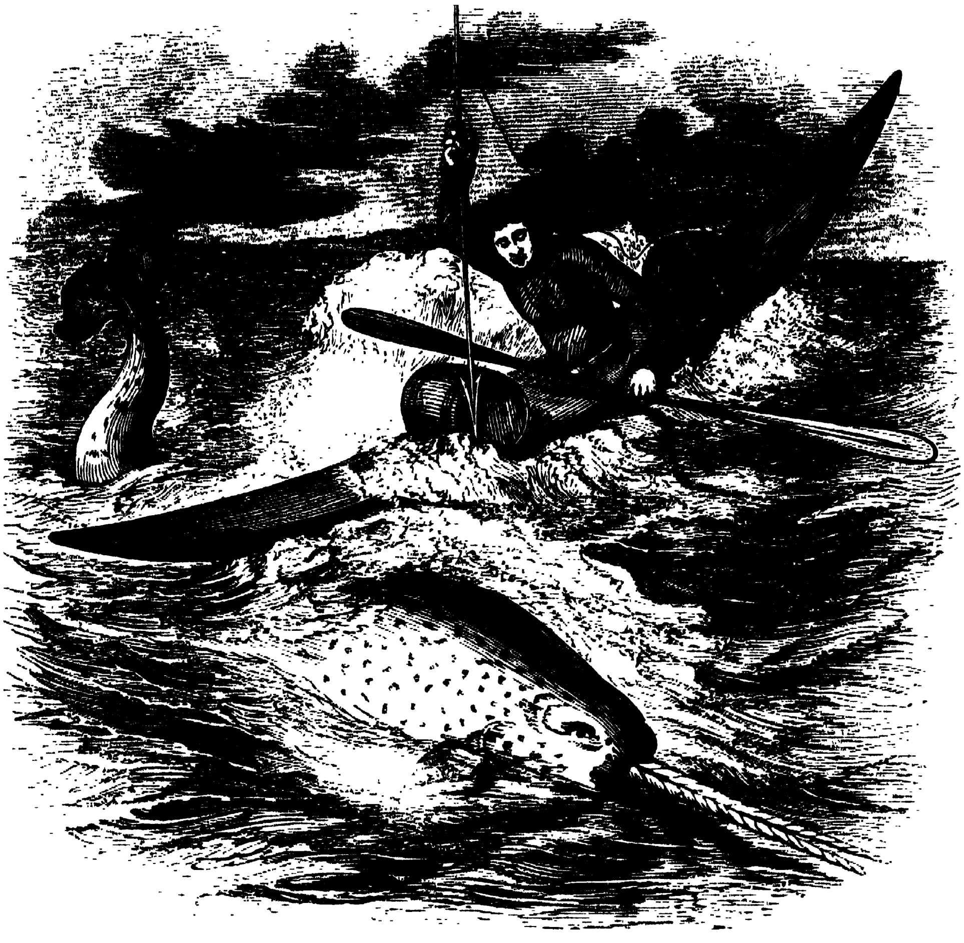
(*Monodon monoceros*). The genus Monodon, of which the Narwhal is the only recognised species, is provisionally placed by Cuvier in the family Delphinidæ It evidently forms the type of a distinct group. Among the cetacea inhabiting the dreary realms of the Polar Ocean, the narwhal, if not the largest or among the largest, is nevertheless one of the most remarkable: its general form resembles that of the porpoises; it has, however, no teeth, properly so called, but two ivory tusks, or spears, implanted in the intermaxillary bone, but of which the right remains usually rudimentary and concealed during life. The left tusk, on the contrary, attains to the length of from five to seven or eight and sometimes ten feet in length, and projects from the snout in a right line with the body, tapering gradually to a point, with a spiral twist (rope-like) throughout its whole extent (Fig. 1091), where, by an oversight, the tusks have been transposed. In its structure and growth this tusk resembles that of the elephant, being hollow at its base or root, and solid at its extremity. It is in the male only that this spear-like weapon, under ordinary circumstances, becomes duly developed, the females (and indeed the young males) having the left as well as the right tusk concealed within its bony socket. This rule, however, is not invariable, for females have not only been seen with the left tusk projecting, but the right also, if we may credit the account of Lacepède, who states that Capt. Dirck Peterson, commander of a vessel called the Golden Lion, brought to Hamburg, in 1684, the skull of a female narwhal, having two tusks implanted in it, of which the left measured seven feet five inches, the right seven feet. It may be added that Capt. Scoresby brought home the skull of a female narwhal in which both tusks projected, though only to the distance of two and a quarter inches, and which was examined by Sir E Home Nor with respect to the male must it be supposed that the right tusk never becomes developed, for, on the contrary, instances sometimes occur in which the right tusk projects externally nearly as far as the left, and there are grounds for supposing that when the left becomes lost, or broken by accident, the right tusk becomes developed to supply the deficiency Formerly these horns, or tusks, were looked upon to be the horns of the fabulous land unicorn, and therefore they were valued as an inestimable curiosity, and sold excessively dear, till the Greenland fishery was set on foot, when they became more common, and their real nature known

The use assigned to the tusk of the narwhal by Crantz, viz that of uprooting marine vegetables on which to feed, is altogether a supposition As the male only has this instrument developed, or generally the male, the female must be reduced to sad difficulties in the procuring of food, but in truth the position of the tusk renders such a use as is here attributed to it impossible. Moreover the narwhal does not subsist on marine fuci, or algæ, but on soft animal matters, as mollusks and fish. Capt. Scoresby found the remains of cuttle-fish in the stomachs of several which were opened by him, and similar remains were also found in the stomach of one driven ashore near Boston.

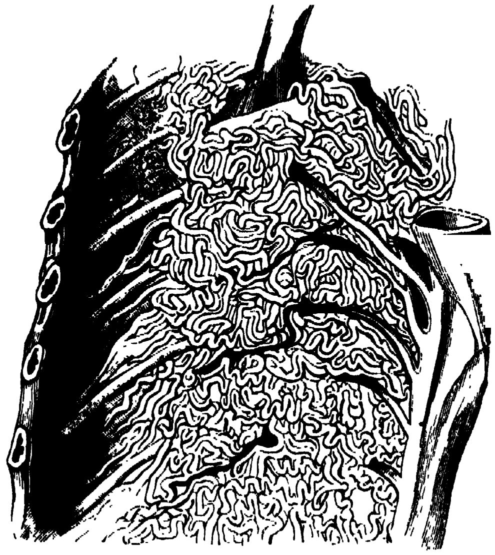
In general form the narwhal resembles the porpoise, but the head is small and blunt; the mouth is small, and not capable of much extension. The under-lip is wedge shaped. The eyes are placed in a line with the opening of the mouth, at the distance of thirteen or fourteen inches from the snout, and of small size, being about an inch in diameter. The spiracle, or blow-hole, is a single orifice of a semicircular form, on the top of the head, directly over the eyes. The fins, or flippers, are about fourteen or fifteen inches long, and from



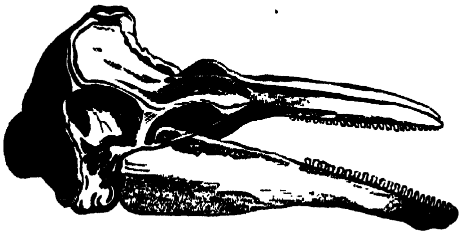
1076.—Skeleton of Porpoise.



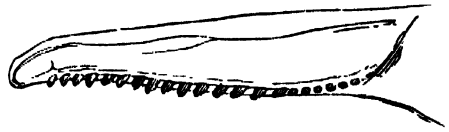
1090.—Spearing the Narwhal.



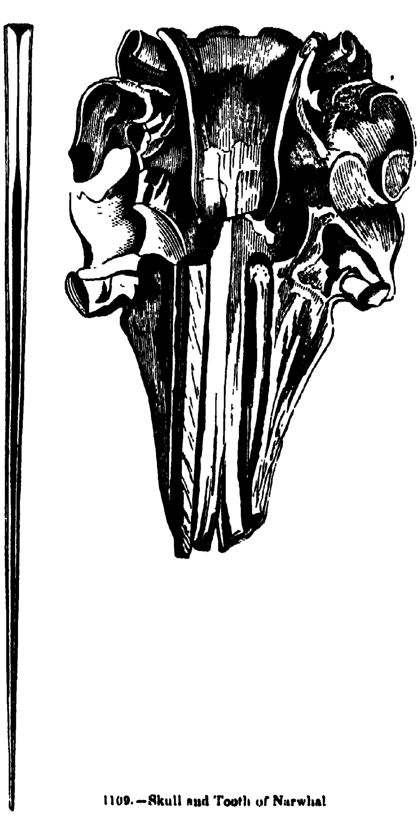
1073.—Vascular Apparatus of Whale.



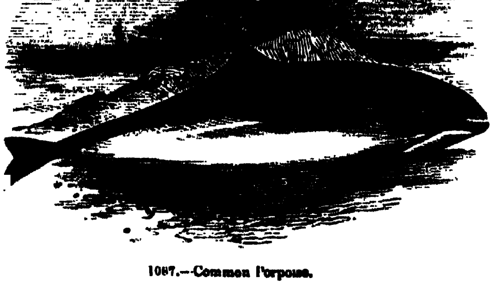
1084.—Skull of Dolphin.



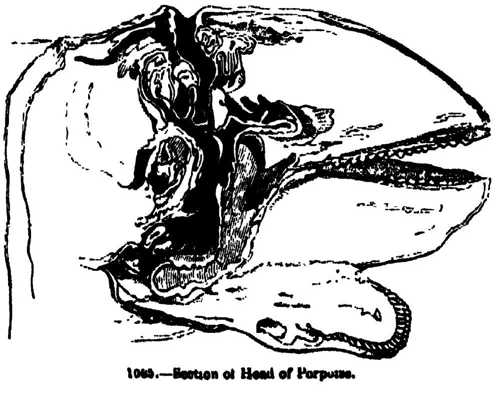
1088.—Teeth of Porpoise



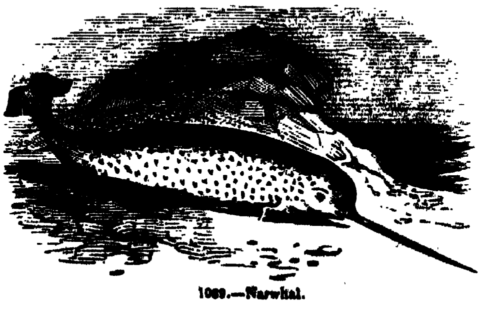
1109.—Skull and Tooth of Narwhal



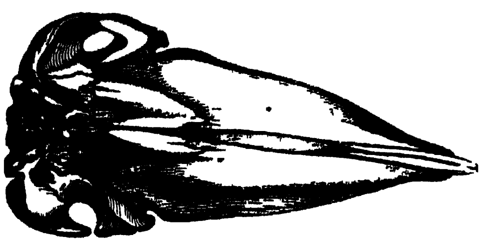
1087.—Common Porpoise.



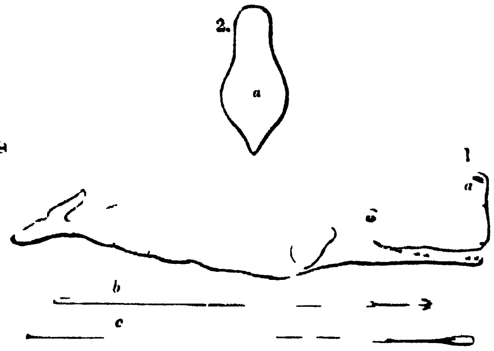
1085.—Section of Head of Porpoise.



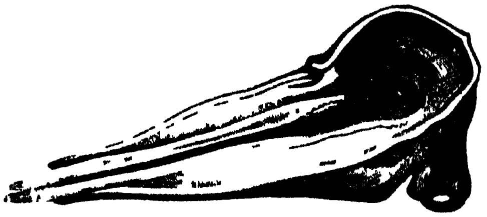
1089.—Narwhal.



1099 —Skull of Spermaceti Whale seen from below

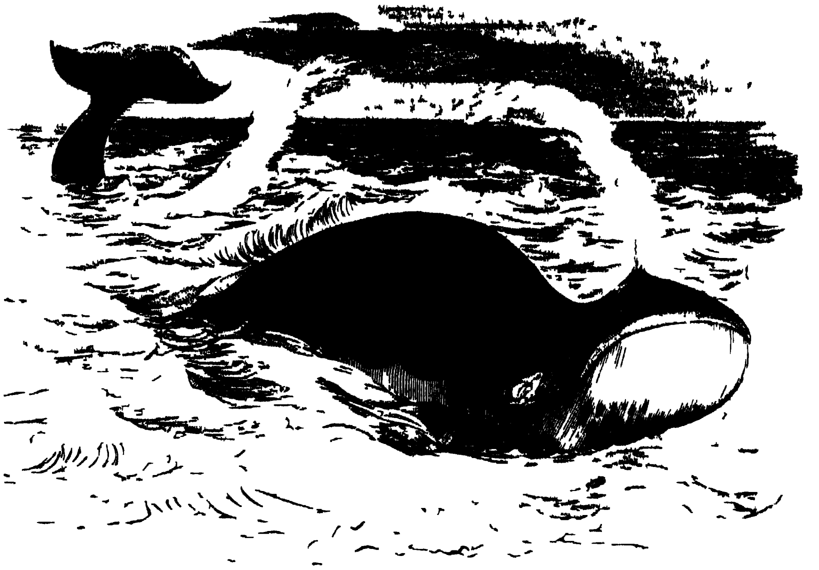


109 .—Spermaceti Whale.

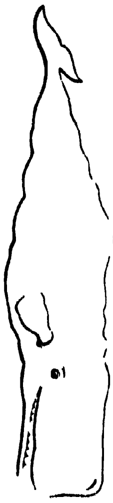


1095 —Skull of Spermaceti Whale seen from above

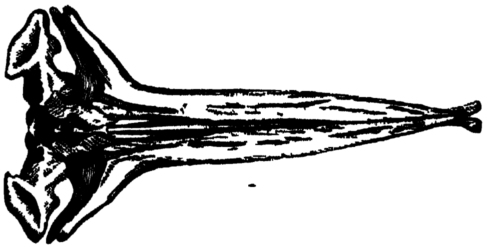
1097 —Lower Jaw of Spermaceti Whale



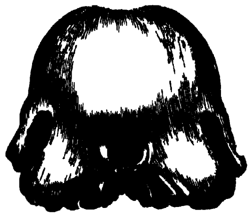
1105 —Greenland Whale



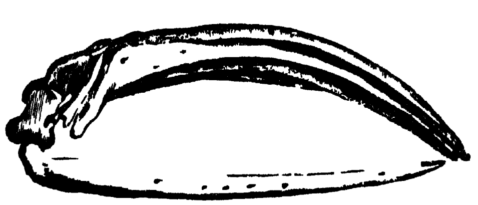
1093 Spermaceti Whale.



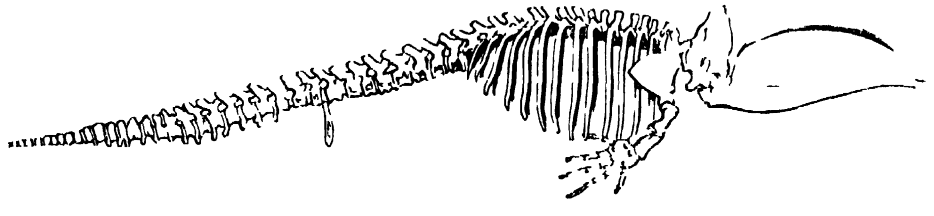
1103 —Skull of Greenland Whale, under view, lower jaw removed



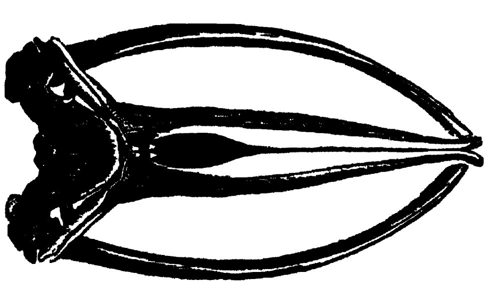
019 —Skull of Spermaceti Whale, back view



11 —Skull of Greenland Whale in profile

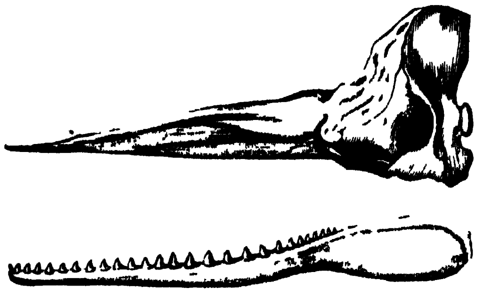


1104 —Skeleton of Greenland Whale



1102.—Skull of Greenland Whale, upper view

1092.—Beluga



1094 —Skull of Spermaceti Whale, in profile.

six to eight broad; their situation on the sides of the animal being at one-fifth of its length from the snout. The breadth of the tail is from fifteen to twenty inches. There is no dorsal fin, but a sharp ridge runs down the centre of the back, the edge of which is generally found to be rough and worn, as if by rubbing against the ice. At an early age the narwhal is blackish-grey on the back, with numerous darker spots and markings running into each other, forming a general dusky black surface. The sides are almost white, with dusky and more open markings: the under surface is white. In adult specimens the ground colour of the back is yellowish-white, with markings varying from dark grey to dusky-black, and of a roundish or oval figure, with interspaces of white or yellowish-white between them. The skin resembles that of the common Greenland whale (Balæna mysticetus), but is thinner. The female narwhal produces a single young one at a birth, which she nourishes with milk for several months.

To the rapidity, the great powers, and the ferocity of the narwhal when attacked, many writers have borne testimony. Its form is admirably adapted for cleaving the waters, and we can well believe that the shock of its weapon, driven full tilt against an enemy, must produce a terrible effect. The ribs of the stoutest boat would be transfixed by the dint of such a blow, far more easily than was ever shield by the lance of knight in battle or tournament. Several instances have indeed been known in which the animal has plunged his weapon deep into the thick oak timbers of a ship, when it has fortunately snapped short, the fragment remaining fixed in the orifice, so as to plug it up. A portion of wood taken from the hull of a ship with a piece of narwhal's tusk firmly imbedded in it, came some few years ago under our own inspection. It is probably only in defence of the females and their young, unless indeed when attacked himself, that the male narwhal thus rushes against ships or boats; for we utterly discredit the usual accounts of its causeless and indiscriminate attacks upon any object which approaches within its range. Doubtless when wounded and harassed it becomes desperate; and its power, its velocity, and weapon combine to render it formidable.

The narwhal is gregarious, associating in troops of from six or eight to twenty or more, and numbers are often seen clustered together, both in the open sea, and in bays and inlets free from the ice, forming a compact phalanx, moving gently and slowly along. Under such circumstances the independent movements of each individual are necessarily embarrassed, so that a considerable slaughter may be easily effected among them. When attacked at such a time, the hind ranks, instead of turning against their assailants press upon those before, sliding their long weapons over the glossy backs of their leaders, and all becomes disorder and confusion. Opportunities of this kind are welcome to the Greenlanders, to whom the narwhal is an important animal. Independently of the oil, which the narwhal yields in considerable quantity and of excellent quality, the flesh is much esteemed by these people as food, and eaten both fresh and in a dried and smoked state, being prepared over the fire of their huts. The tendons of the muscles are useful in the preparation of thin but tough cordage; and Duhamel states (see his 'Traité des Pêches') that several membranous sacs are obtained from the gullet made use of as parts of their fishing apparatus The ivory spear, or tusk, the Greenlanders employ in various household and economical purposes instead of wood, and in the manufacture of weapons, as darts or arrows, &c. When struck by a harpoon, the narwhal dives with great velocity, and in the same manner as the whale, but not to the same extent. In general it descends about 200 fathoms; and on returning to the surface, is despatched by a whale lance without any difficulty. The blubber is about three inches in thickness, and invests the whole body: it affords about half a ton of oil

The narwhal may be registered among the occasional visitants to the British shores. Of its visits, however, only three instances are on record, as far as we can learn. The first is recorded by Nicolas Tulpius in 1648. The second is of one killed, in 1800, near Boston in Lincolnshire, and said to have been twenty-five feet in length. The third instance occurred in 1806, at the Sound of Weesdale, in Shetland.

1092.—THE BELUGA

(*Delphinapterus Leucas*, Pall.). The genus Delphinapterus is characterized by the presence of a dorsal fin. Head small, and blunt; teeth variable in number. The Beluga (White Fish, or White Whale), is a native of the high northern latitudes, and is one of the most beautiful, confident, and active of its race. Its colour is clear milk-white, sometimes tinged with a rose-colour or a slight wash of yellow and the skin is very soft, smooth, and slippery. It associates in small troops or families, and is in the habit of following and surrounding boats or ships, gambolling like the dolphin around them; or chasing its finny prey, in quest of which it often ascends the mouths of rivers, occasionally to a considerable distance. During the intense severity of the winter, the beluga is said to migrate southwards; this journey cannot, however, be to any great extent, as it very rarely occurs in the sea around the most northern portion of the British Isles. Indeed we do not know of more than one instance on record of this species visiting our coasts; we refer to the individual taken, in the summer of 1815, in the Frith of Forth, where it had been observed for nearly three months ascending with the flood-tide, and regularly descending with the ebb. This individual, as is proved by the time of the year in which it was seen, was a stray wanderer from its native latitudes, and not on a regular journey of migration. The flesh of this animal is eaten by the Greenlanders and other people of the boreal regions. Crantz says it is as red as beef, and of somewhat similar flavour: Pallas, that it is black. The carcass yields excellent oil, and it is principally for the sake of this that the beluga is hunted. It is sometimes intercepted by nets extended across the inlet or stream it has entered, and attacked with lances while endeavouring to force its return: on other occasions it is harpooned, and sometimes even caught by means of hooks baited with fish. The female produces one or two young at a birth, towards which she displays the strongest attachment; they follow her in all her movements, and do not quit her until they are of considerable size. Cuvier states that the teeth are nine in number on each side above and below. Mr. Bell states that, in a cranium in his possession, there are eight teeth in the upper and six in the lower jaw, on each side; but that, as two have evidently fallen from the former, there must have been ten originally. Aged individuals are often found without any teeth in the upper jaw. The beluga measures, when adult, seventeen or eighteen feet in length. That caught in the Frith of Forth measured thirteen feet four inches, and nearly nine feet in circumference at the thickest part, viz., the centre of the body, whence it tapers both to the head and to the tail.

Family CATODONTIDÆ (*Physeteridæ*, Bell). This family, which includes the Cachalots, is characterized by the immoderate size of the head, which equals one third the length of the body, and terminates in a deep, abrupt, truncate snout, advancing beyond the lower jaw, which is narrow, the two rami being in contact for the greater part of their length, and armed each with a row of compressed, solid, conical teeth, at equal distances fitting into cavities in the upper jaw, which is either destitute of teeth, or merely furnished with a few in a rudimentary state and almost covered by the gum. The blow holes open externally by a single orifice. The tongue is small and pointed.

1093.—THE COMMON CACHALOT, OR SPERMACETI WHALE

(*Physeter macrocephalus*, Linn.; *Physeter Catodon*, Linn., *Catodon trumpo*, Lacépède, Blunt-headed Cachalot, Pennant). The Cachalot is one of the mightiest of the Cetacea, the adult male measuring upwards of seventy feet in length; and from its powers, and not unfrequent paroxysms of fury, is one of the most dangerous of the monsters of the deep which the daring sailor is called upon to combat.

The cachalot roams the ocean at pleasure, and is seen in all latitudes, but its native regions may be considered as the arctic and antarctic seas.* It would seem that the animal is gregarious, and is generally seen in parties consisting of half grown males, or of females attended by their young, and guarded by one or two males of the largest size. When solitary cachalots are observed, they invariably prove to be aged males

According to Mr F. De Bell Bennett ('Zool. Proceeds.,' 1837, p. 39), the speed of an alarmed cachalot does not exceed from eight to ten miles an hour, though, when harpooned, its temporary velocity may be estimated from twelve to fifteen miles. When thus flying from pursuit, the huge animal moves with a regular and majestic, although rapid pace, and with a gently leaping gait; the anterior and upper portions of the colossal head are raised above the water, and a portion of the back is also frequently exhibited. When parties are pursued, they often move in lines like a troop of horse, and exert all their movements, and descend, rise, and even spout in unison. When about to plunge deep, the cachalot assumes a vertical position, raising the caudal fin, or "flukes," perpendicularly in the air, an action that is performed leisurely, and one that distinguishes this from most other species of Cetacea. This evolution is not, however, invariably performed, since, when tranquilly feeding, or carelessly avoiding a boat, the cachalot will descend very gradually, lowering itself, or as it is technically termed, "settling down."

The ordinary length of time which the cachalot remains under water, when alarmed or wounded, is three-quarters of an hour, but in some instances the time has extended, it is said, to an hour and a quarter.

The chase of this animal is very hazardous, for although generally the troop fly on the appearance of danger, yet, when one is wounded, the others often come to the rescue, especially in the case of the females, which mutually assist each other; while the males, as Mr. Bennett affirms, commonly make a speedy retreat. One of the latter, however, if attacked and infuriated, is extremely formidable, and will rush with immense velocity, head foremost, against a boat, shivering it to pieces, or, lashing with its tail, will cut it asunder, scattering the hapless mariners, some, perhaps, struck dead, others maimed, on the surface of the rolling ocean. Occurrences of this kind are indeed numerous, and many a thrilling narrative of the "hair-breadth 'scapes," and of loss of men and boats, in the close encounter with this giant of the waters, can an old South Sea whaler tell, and many have been recorded, which of themselves would fill a goodly and not uninteresting volume. Not only are the boats in jeopardy, but the "whaling vessel" itself is not secure. Mr. Bell refers to an authenticated instance of an American ship of large size being stove in and foundered by a blow from a gigantic male cachalot rushing head foremost against it.

The food of the cachalot consists of seals, and fishes of a large size, which it pursues with great pertinacity; but it would appear that a large species of cuttle-fish (Octopus) forms its principal nutriment.

We have already noticed the magnitude of the head of the present species, and we may here observe that this magnitude is not owing to any extraordinary development of the skull: the maxillary and intermaxillary bones are indeed prolonged, but the cranial portion is small, and rises abruptly (see Fig. 1094, Skull of the Cachalot in profile). If, however, we look at the upper surface of the skull (Fig. 1095), we find the top deeply concave, with a margin continued along the outer edge of each maxillary bone. It is in this concavity principally that the substance termed spermaceti, or more properly cetine, is lodged, and that in such immense quantity as to give to the head its extraordinary size and figure. This substance, in a semi fluid state, is contained in a tissue of cells, not only filling up the concavity of the surface of the skull, but giving to the head a singular elevation, the whole being invested by a dense cartilaginous expansion Cetine is also found in cells along the back and in other parts of the body. This cetine exists mixed with oil, and when the whale is killed, a hole is made in the outer and upper part of the head, and the oleaginous fluid is baled out with buckets. The first process is the separation of the oil by means of draining and squeezing; the impure cetine is then put into barrels, in the state of a yellow unctuous mass, and is afterwards further purified by the following process.—"The mass is put into hair or woollen bags, and pressed between plates of iron in a screw-press, until it becomes hard and brittle; it is then broken into small pieces and thrown into boiling water, where it melts and the impurities are separated from it. After being cooled and taken from the first water, it is put into a boiler of clean water, and a weak solution of potash is gradually added. This is thrice repeated, after which the whole is poured into coolers, when the spermaceti concretes into a white semicrystallized mass, and on being cut into small pieces exhibits a beautiful flaky appearance, so well known as belonging to the spermaceti of commerce." An ordinary-sized whale will yield twelve large barrels of crude spermaceti.

Like other whales, the cachalot is clothed with a layer of blubber, but in less abundance than in the common whale (Balæna mysticetus). The oil procured from it, however, is thinner and more valuable. Fig. 1096 represents in outline, *a*, the spermaceti whale, with the sections marked for flencing; *b*, the anterior aspect of the head; *c*, the harpoon; *d*, the lance.

There is another substance produced by the cachalot, known in commerce under the name of ambergris. This substance, in the form of opake greyish masses, marbled with darker tints, and somewhat hard and brittle, is found floating in many parts of the sea, or thrown up on the shore. It is most abundant in the neighbourhood of the Moluccas and along the coasts of China, Japan, Madagascar, Africa, and also South America. Its consistence resembles that of common wax; it is fatty, inflammable, and when heated emits a fragrant but powerful musky odour. In general it is mixed up with the beaks of cuttle-fish, the bones of fishes, and other foreign matters. For a long time the nature of this substance was utterly unknown. It has been regarded by some as a sort of bitumen, or as a kind of gum, and by others as a composition of wax and honey. It is now known to be produced, as a concretion, in the intestines of the cachalot, and is often found in sickly or diseased animals: indeed, Dr. Schwediawer asserts that the existence of these indigestible concretions often occasions abdominal abscesses, after the bursting of which the ambergris is found floating on the surface of the sea. Formerly this substance was in high estimation as a medicine; at present it is only used as a perfume, but is seldom to be obtained unadulterated. As in most of the Cetacea, the skull of the cachalot is destitute of symmetry, having a turn as it were, or, bend, towards the left; it is asserted also that the left eye is smaller and more limited in visual range than the right, on which account the sailors endeavour to attack it on its left. Mr. Bennett makes no allusion to this circumstance, but merely observes that if boats are not brought within the line of vision, the animal may be approached with great facility, the sense of hearing being very imperfect; "a deficiency, however, which appears to be in some measure compensated for by the perfection in which it possesses the sense of touch, through the medium of a smooth skin abundantly supplied with nervous papillæ. It even appears as though the cachalots had the means of conveying impressions to one another through the water, at considerable distances; for it is a fact well known to the southern whalers, that upon a cachalot being struck from a boat, others that are miles distant will almost instantaneously display by their actions an apparent consciousness of what has occurred, and either take themselves off or come down to the aid of their injured companion." This intelligence he supposes can only be communicated by a concussion of the water.

---

* Baron Cuvier considers that only one species of spermaceti whale, or cachalot, exists And Fred. Cuvier adopts his opinion, with some doubt as to whether the southern cachalot may not be distinct, which Mr. Bell regards as being the fact. As the elucidation of doubtful species is not our present object, we leave the question open, and speak of the cachalot in general terms as a native of the Northern and Southern oceans.

We have said that the cachalot roams all seas; it appears, however, to be more scarce in the arctic latitudes than formerly, but is abundant in the Southern Ocean, and within the regions of the antarctic circle. According to Colnett, the neighbourhood of the Galapagos constitutes a sort of rendezvous in spring for all the cachalots frequenting the coasts of Mexico, Peru, and the Gulf of Panama.

We have several instances on record of this animal having been captured on our own coast, and on that of the adjacent continent; it has been seen in the Mediterranean, off the southern shores of Europe, as well as off the shores of Southern Africa, and in the Channel of Mozambique.

In 1769 a cachalot was killed in the Frith of Forth, and one was seen off the Kentish coast. In 1774 a large one was stranded on the coast of Norfolk; some few years since a small one was captured in the Thames near Gravesend. In 1784 thirty-two cachalots ran aground on the coast of Audierne, being stranded on the sands towards Cape Estain. In 1819 one of 63 feet in length was killed in Whitstable Bay. According to Lowe, the cachalot "is often driven ashore about the Orkneys, nay, sometimes caught."

The general colour of this species is greyish black above, lighter beneath; the eye is small, with a few stiff hairs around. There is no dorsal fin, but a distinct protuberance; the pectoral fins are small, and slightly grooved longitudinally. Fig. 1097 represents a portion of the lower jaw, to show the teeth. Fig. 1098, the skull seen from below. Fig. 1099, the back view of the skull, showing its occipital elevation above the articulating processes and foramen magnum (See also Fig. 1094).

Family BALÆNIDÆ (the true Whales).—These animals equal the cachalot in size, but have the head more proportionate to the bulk of the body, and display a less clumsy contour. They are moreover distinguished from all other Cetacea by the total absence of teeth; their place in the upper jaw, which is extremely narrow, being supplied by pendant horny laminæ, called whalebone, or baleen. The palate of the whale is arched and oval (see Fig. 1100), and forms a vaulted roof to which the plates of baleen are attached transversely, in two rows, parallel to each other. Each plate consists of a central coarse fibrous layer, lying between two, which are compact and externally polished, constituting a sort of enamel or varnish; but which outer layers do not cover the internal or true baleen to its extreme free edge: the latter, therefore, extends beyond the former, and terminates in a fringe, in which are entangled the small molluscous animals which constitute the food of this huge animal. Each plate of baleen is of a subtriangular figure, and its base, attached to the palate, has a long furrow, fixed upon a pulp, buried deeply in the firm vascular substance of the gum covering the under surface of the maxillary and intermaxillary bones. The outer layers, of compact matter, are continuous with a white horny layer of the gum which passes on to the surface of each plate, and the pulp is therefore the secreting organ of the internal layer of coarse elastic fibres. The number of plates composing each row is from 300 to 400, and the palate being oval, the longest are those situated in medio; those towards the muzzle and near the entrance of the throat being consequently the shortest. The longest of these laminæ often measure 15 feet and upwards in length; and the abbreviation anteriorly and posteriorly is gradual. Each plate, as we have said, is fringed, and the filaments of the fringe are very numerous, and fill up the cavity of the mouth sufficiently to form a strainer. The lower jaw is arched boldly outwards on each side, so as to form a broad ellipse, the margin of a huge spoon which ladles in and conveys to the strainer or fringes vast quantities of water replete with shoals of small crustacea, of the clio borealis, and other small tenants of the briny deep, which absolutely crowd its waters. The tongue is very large, thick, fleshy, fat, soft, and spongy. In the Greenland whale it often exceeds 20 feet in length, and nine or ten in width. The orifice of the gullet is very small; so that fish even of a moderate size cannot pass down. The eyes are small, and seated just above the angle of the enormous mouth. There are two distinct blow-holes on the top of the head. The skin is smooth and glossy. The blubber is abundant. In the Greenland whale the layer of this subcutaneous *lard* varies from eight or ten to 20 inches in depth, and a single whale of large size will yield about 40 tons;* but much more has occasionally been obtained. The lips appear to be composed of little more than cellular tissue and blubber.

Referring to our pictorial specimens of osteology, Fig. 1101 shows the skull of the Greenland whale in profile; Fig. 1102, an upper view of the same, Fig. 1103, an under view of the same, with the lower jaw removed; Fig. 1104 represents the skeleton of the Greenland whale, in which the rudiments of the pelvis are apparent.

1105, 1106.—THE GREENLAND WHALE, OR GREAT MYSTICETE

(*Balæna Mysticetus*). This colossal animal, yielding oil and whalebone, both valuable in a commercial point of view, is a native of the arctic seas, whither it is followed by a daring race of mariners amidst horrid icebergs and extensive floes, where danger in every form is imminent. Cold, intense beyond description, this has to be borne; hunger, for often are the vessels ice-bound, and the provisions scanty,—this has to be endured; watchfulness, fatigue, and the chance of being ingulfed during the tremendous conflict,—these the sailor bears and braves, content if he return home with a rich harvest gleaned from the arctic waters. The Greenland whale, therefore, even in this sense, is one of the most interesting of the Cetacea; nor is it less so from its habits and manners, which various observers, and in particular Captain Scoresby, have contributed to illustrate. The ordinary length of this species is from sixty to seventy or eighty feet, but it is said to attain occasionally to greater dimensions. Seen at a distance, it appears as a dark ill-defined mass floating on the surface of the water, and indeed it is only when lying on its side, after death, that its true outline is to be made out. (See Fig. 1106.)

It is upon minute animals, such as small shrimp-like crustacea, the clio borealis, medusæ, &c., that this huge animal supports his colossal frame. Ploughing his way beneath the surface with open mouth, he engulfs his prey by myriads, which become entangled among the filaments fringing the baleen, and thus are as it were sifted from the water, which escapes at the sides. Every few minutes he rises to breathe, expelling through the blow-holes a column of steam and water, and again plunges to continue his repast. In order to dive, the whale first raises his head, and then plunges it under the surface, drawing his tail at the same time underneath the body so as to form the segment of a circle; instantaneously he strikes it out, and goes down like a shot. The length of time passed beneath the surface varies, but according to Captain Scoresby it seldom exceeds half an hour, and this only when harpooned; under such circumstances, on appearing again, which is generally at a considerable distance from the spot where the animal descended, he is always in a state of great exhaustion, owing chiefly to the immense pressure it has sustained, but no doubt in part to the long suspension of respiration: under ordinary circumstances the whale rises to breathe every eight or ten minutes.

The velocity of the whale is very great. Captain Scoresby harpooned one which, on being struck, descended four hundred fathoms, at the rate of eight miles an hour. But under the pain of this weapon they often descend a much greater depth, subjecting themselves to an enormous pressure of water, and are at the same time so overcome by terror, as often to bruise themselves severely by the rocks met with in their course, and sometimes even to strike so violently against the hard bed of the ocean as to fracture their jaws. At the depth of 800 fathoms Captain Scoresby calculates the pressure at 211,200 tons.

The most pleasing as well as astonishing exhibition of the power and activity of these animals is during the pairing season, when they gambol and frolic in the waters, throwing themselves about in the exuberance of delight, little aware of the approach of their enemies. Sometimes they dart along the surface, and then dive and re-ascend with such energy as to leap entirely out of the water; sometimes they raise themselves perpendicularly, sometimes, head downwards, they flourish their tails aloft, and lash the water with tremendous violence, throwing the sea around them into foam, and producing a roaring noise resounding to a considerable distance. The tail is, in fact, not only their organ of locomotion, but their weapon of defence, and though extremely timid and peaceful, they often use it, when driven to despair, with terrible effect; and this the more particularly when one of a pair is struck, or the life of the cub is in danger. The mutual attachment of each pair, and the affection of the female for her young one, are intense; and many are the instances on record in which the one has died in defending the other. Captain Anderson relates that, "having struck one of two whales, a male and female, that were in company together, the wounded one made a long and terrible resistance; it struck down a boat with five men in it by a single blow of the tail, and all went to the bottom; the other still attended its companion, and lent it every assistance, until at last the whale that had been struck sunk under its wounds, while its faithful associate, disdaining to survive the loss, stretched itself upon the dead animal, sharing its fate." A more affecting instance, exemplifying the strength of maternal attachment, is related by Captain Scoresby. One of his harpooners struck a cub, in the hope of capturing the mother (a plan, we are sorry to say, frequently made use of), who arose, and seizing the young one with her paddle, dived instantly, dragging about a hundred fathoms of line out of the boat with considerable velocity. Again she arose to the surface, furiously darted to and fro; frequently stopping short, or suddenly changing her direction, and exhibiting every symptom of extreme agony. For a considerable length of time she thus continued to act, although closely pursued by the boats, but her concern for her offspring made her regardless of the danger by which she was surrounded. After two fruitless trials, she was harpooned, but even then did not attempt to escape, notwithstanding her sufferings, but still clung to her offspring, and allowed the other boats to approach, so that in a few minutes three more harpoons were fastened, and in the course of an hour both the mother and cub were floating dead

The female of this species produces only one cub at a birth, which remains under her care for a considerable period, until, by the development of the baleen plates, it is enabled to procure its own support. The whale usually lives in pairs, but sometimes numbers are seen together, in places to which abundance of food or other causes induce them to resort

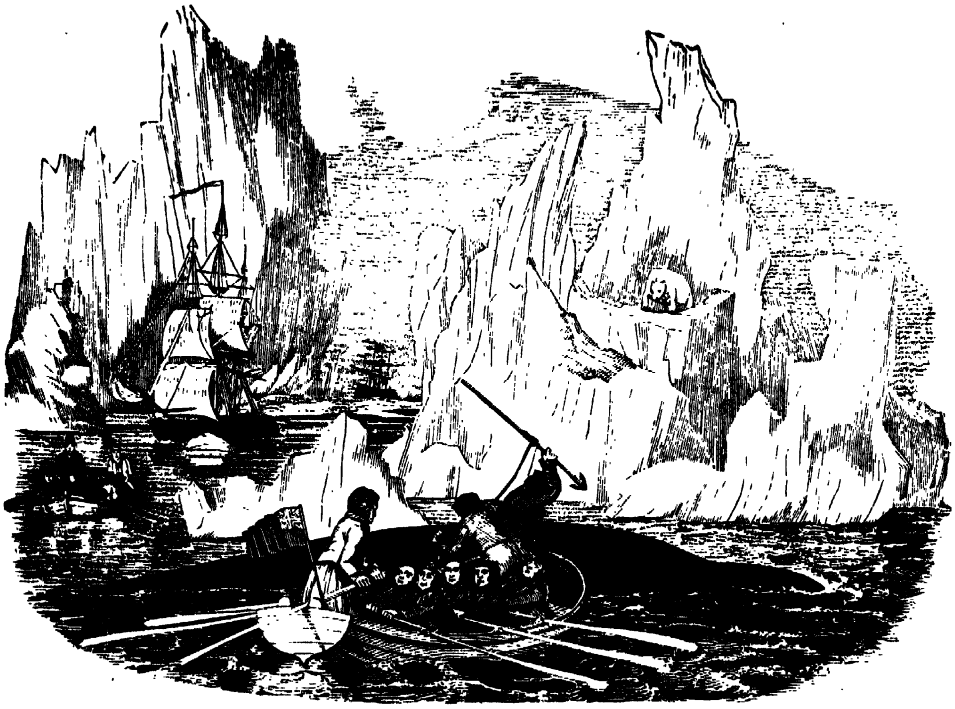
The unceasing persecution to which the Greenland whale has been long subjected has not only thinned its numbers, but driven it from localities in which it was formerly common. It is at present chiefly to be found in the icy seas of Spitzbergen, in Davis's Straits, Baffin's Bay, and the waters of the polar circle. General colour above, a velvety-blackish grey; under parts, white.

An allied species, the Cape or Southern Whale (Balæna Australis, Cuv.), but not attaining to so large a size, inhabits the Southern Ocean, and in the month of June visits the bays of Africa adjacent to the Cape of Good Hope, for the purpose of bringing forth its young It is, in fact, only the females that thus approach the coast, and they return to the main ocean in September. Two skeletons, brought by De Lalande in 1820, are in the museum of Paris, and the osteological differences between this and the Greenland whale have been described by Cuvier The speculations of commerce have been directed to this representative of the northern mysticete, which at a future day may in like manner become driven from its old haunts to more remote abodes.

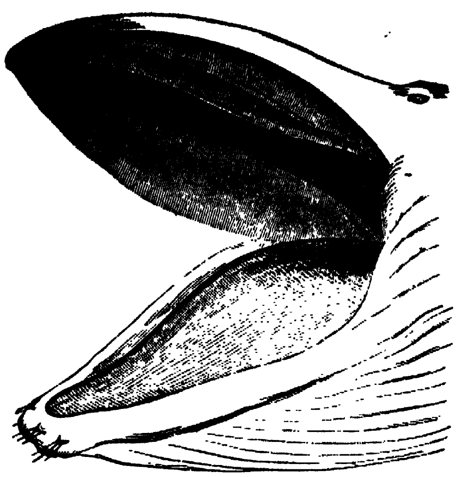
Fig. 1107 is the outline of a species of Balæna (Balæna Antipodarum), tenanting the ocean near New Zealand. Fig. 1108 represents the mode of attacking the Greenland whale; and Fig. 1109 conveys some idea of the dangers of the contest. The cut relates to the following incident:—"Captain

---

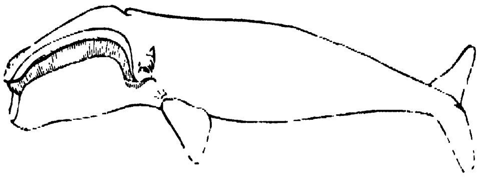
* The proportion of pure oil to the blubber is as three to four.



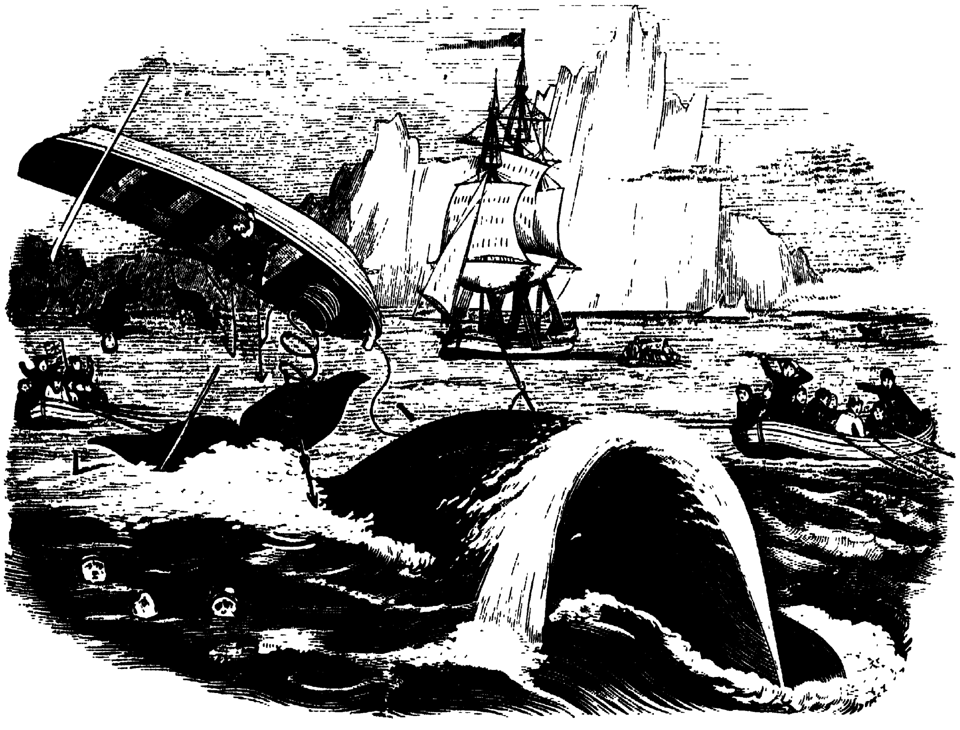
1108.—Harpooning the Whale



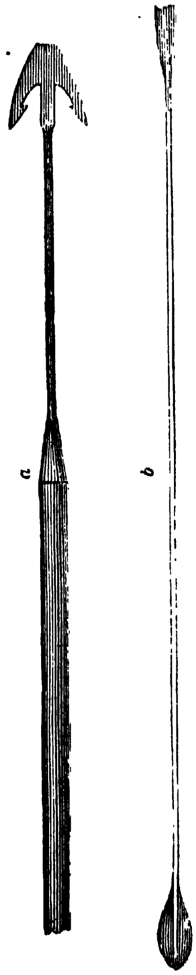
100.—Inside Jaws of Greenland Whale.



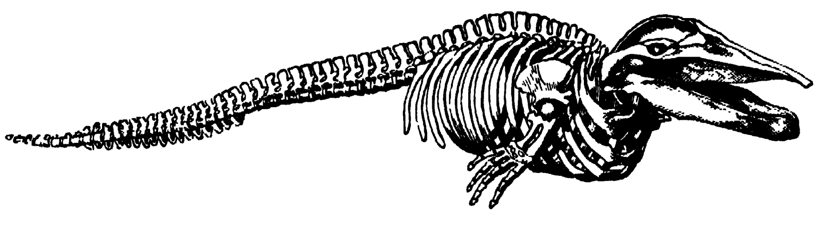
1107.—New Zealand Whale.



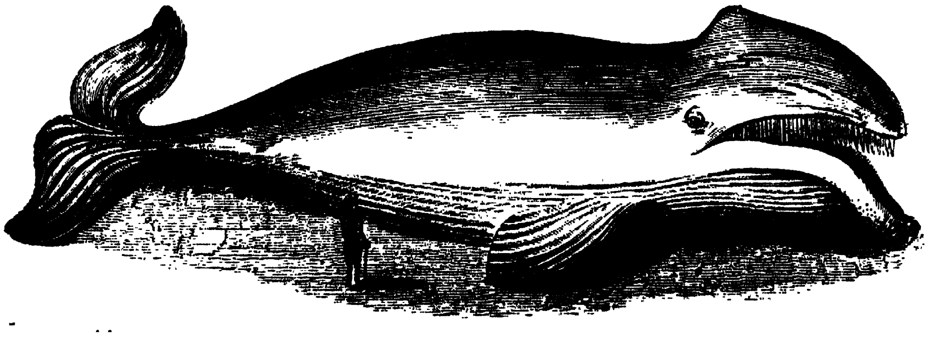
1109.—Dangers of the Whale-Fishery.



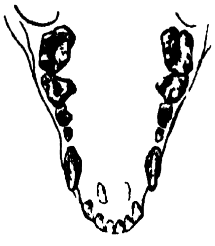
1110.—Whaling Harpoon and Lance



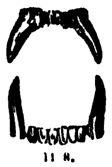
1112.—Skeleton of Rorqual.



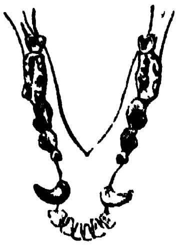
1114.—Rufous Coati



1123

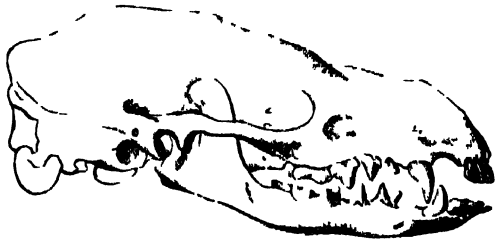


1118.



1124

1115.—Racoon



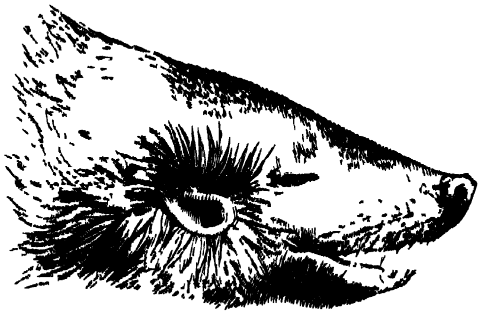
1122.—Skull of Teledu.

1119.—Head of Skunk

1113.—Cochin China Monkey

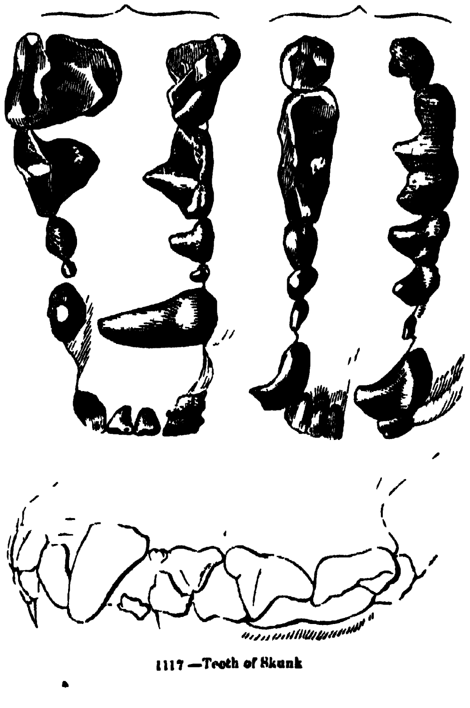
1116.—Skunk

1120.—Teledu

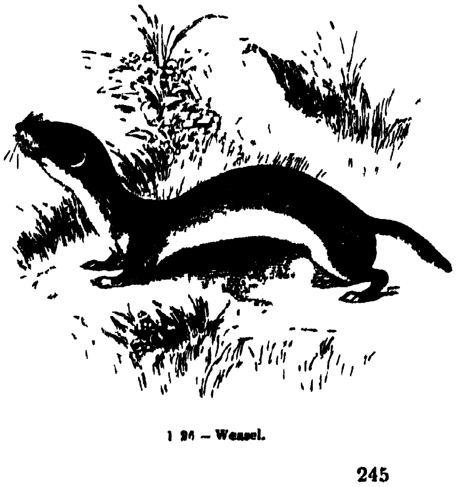


1121.—Head of Teledu

1125.—Ferret.



1117.—Teeth of Skunk



1126.—Weasel.

Lyons, of the Raith of Leith, while prosecuting the whale fishery on the Labrador coast, in the season of 1802, discovered a large whale at a short distance from the ship. Four boats were sent in pursuit, and two of them succeeded in approaching it so closely together, that two harpoons were struck at the same moment. The whale descended a few fathoms in the direction of another of the boats, which was on the advance, rose accidentally beneath it, struck it with its head, and threw the boat, men, and apparatus about fifteen feet into the air. It was inverted by the stroke, and fell into the water with its keel upwards. All the people were picked up alive by the fourth boat, excepting one man, who, having got entangled in the boat, fell beneath it, and was unfortunately drowned." Fig. 1110 represents, *a*, the harpoon; *b*, the lance used in the attack.

1111, 1112.—The Rorqual

(***Balænoptera Boops***, Flem.; Balænoptera Rorqual, Lacép.). The Rorquals, constituting the genus Balænoptera, differ from the Greenland whale and its allies in the possession of a small dorsal fin on the lower part of the back (not seen in the position of the pictorial specimen), and a series of longitudinal folds on the skin of the under surface of the body, and particularly the throat and chest. The plates of baleen are short. The food of these animals consists of fishes, and especially herrings and other species which go in shoals, and they engulf multitudes at once in the abyss of their capacious mouth. They are remarkable for the rapidity and ease of their movements: they dart along or dive with almost unequalled impetuosity, and are dangerous to attack. From this cause, as well as from the small quantity of blubber they afford, and the inferior quality of the baleen, they are seldom chased by the crews of the whaling-vessels. The species do not seem to be as yet well determined.

The Great Rorqual is one of the largest, if not the largest, of this gigantic race of beings, often exceeding a hundred feet in length. Its native regions are the polar seas, where it is seen both in troops and pairs, the paired males and females exhibiting devoted attachment to each other. The rorqual is more restless, more suspicious, and fiercer than the common whale, and when struck by the harpoon descends with such velocity as often to snap the line. It was an individual of this species which, in the month of November, 1827, was stranded near Ostend, and of which the skeleton was subsequently exhibited in London and Paris. The length of the skeleton was ninety-five feet; the head measured twenty-two feet. The spinal column consisted of sixty-two vertebræ; the ribs were fourteen on each side. The expanse of the caudal paddle was twenty-two feet and a half. The opportunity of examining the internal anatomy of this animal was lost, a circumstance lamented in indignant but just terms by M. Van Breda, whose memoir on the subject is published in 'Cuvier's 'Histoire Naturelle des Cétacés.' This writer states that besides the usual plates of baleen, the animal had at the tip of its muzzle a thick tuft of rounded horny filaments, or rather coarse hairs, united at the root by a common membrane, and divided into finer threads at their points; these filaments were of different lengths, some exceeding three feet. This peculiarity had not, we believe, been previously noticed. The weight of this individual when captured was 480,000 pounds, and 4000 gallons of oil were extracted from the blubber. Weight of the skeleton alone, 70,000 pounds. Fig. 1020 represents the skeleton.

Here we close our survey of the specimens of the Cetacea which are contained in our Pictorial Museum. It is a class which yet requires much elucidation; its species are still involved in confusion, and of many almost everything is yet to be learned. They have seldom indeed been contemplated in their native regions by professed naturalists—hence, the changes they may (many of them, at least) undergo in their progress from youth to maturity, the duration of their lives, the rapidity of their growth, and many points in their economy are yet desiderata. Who has counted the years of the whale; who has marked an individual from birth, till, one of the patriarchs of its oceanic race, it has failed beneath the burden of ages? Who has tracked these colossal beings in their migrations, or patiently studied their nicer instincts, their less prominent manners and habits?—Their ways are hidden in the deep, and the little that we know of them is the result of accumulated, but fortuitous observation, to which commerce has impelled a daring class of men, whose great object is their destruction. Much information will be doubtless added from time to time, but after all, many points will necessarily remain beyond our powers of acquisition.

We may conclude by observing that the chace of the whale was carried on by the Norwegians as early as the ninth century, principally, as it would appear, for the sake of its flesh, which was accounted a delicacy. Formerly a species of whale abounded in the Bay of Biscay, and was killed by the inhabitants of the coast for the same object, till at length it was driven away from that bay by incessant persecution; the Biscayan mariners then carried the navigation farther and farther from their own shores, till at last they approached the coasts of Iceland, Greenland, and Newfoundland; and thus was commenced, in the course of the sixteenth century, the northern whale fishery as pursued in modern times; the object being not the flesh of the animal, but the blubber and baleen.

We have now, before leaving the Mammalia, to refer to several new pictorial specimens, illustrative of various groups, and to be regarded in the light of additions to our collection, subsequent to our notice of the orders and families to which they respectively belong. Some of the species are indeed duplicates; others, however, are for the first time introduced into our Pictorial Museum, and merit particular attention.

ADDITIONS TO THE QUADRUMANA.

1113.—The Douc, or Cochin-China Monkey

(*Semnopithecus nemæus*, F. Cuv.). Pygathrix nemæus, Geoffr.; Lasiopyga nemæus, Ill.

The Douc, a genuine example of the genus Semnopithecus, is one of the most beautiful, if not the most beautiful, of all the monkey race. We give the following description from a fine adult male in the Paris Museum. The face is naked, and of an orange colour, surrounded by full long whiskers of a glossy whiteness; the fur of the forehead is blackish, passing into delicate grizzled grey, which is the colour of the whole head, the back, the sides, and abdomen, each hair having annulations of white and dusky black to the number of eleven or twelve. From the eyebrows to the ears extends a pencil of chestnut red; the throat is white; a band, or gorget, of chestnut red extends across the top of the chest from shoulder to shoulder, succeeded by a band of black spreading over the top of each shoulder. The forearms, the tail, and a square patch above its root are of a snowy white. The knees, the legs, and the tarsal portion of the feet are of a rich chestnut; the fingers, the toes, and the thighs are black; space round the callosities, white; callosities and naked skin of the palms, yellow. Fur, full and soft. Length of head and body to root of tail, two feet one inch. Native country, Cochin-China.

The douc has never been brought alive to Europe, and of its habits and manners we have but meagre information. Bezoar-stones are said to be frequently found in its stomach, a proof that it is sacculated, as in the other Semnopitheci, and also in the Colobi.

In the 'Magasin de Zoologie' ('Voyage autour du Monde de la Corvette La Favorite') 1836, it is stated that "these animals live in troops, more or less numerous, in the vast woods which cover the country along the shore; and their manners are certainly far from being wild, as has been supposed. They are, indeed, little troubled by the presence of man, and often come near to the habitations of the Cochin-Chinese, who appear to offer them but little molestation, and do not attempt to draw from the beautiful fur of the doucs all the advantages which might be obtained from such a source. However, the incursions of the sailors of the corvette La Favorite in a very short time inspired these animals with such terror, and so rapid was their flight, that, numerous as they were, they were not procured without difficulty."

Though Buffon, on the authority of M. de Poivre, gave the name of douc to this species, as its native appellation, nevertheless it would seem that such is not the term by which it is known in Cochin-China. M. Rey, the captain of a French merchantman, who visited that country in 1819-20, informs us that these monkeys are there called Venam, which, he says, signifies 'men of the woods.' M. Rey had no difficulty in killing numbers of them, but it was not without great trouble that he succeeded in capturing living individuals. So numerous were they, that on one occasion, in the course of a few hours, a hundred were slaughtered. Desirous, however, of taking some alive, for the purpose of transporting them, if possible, to France, he set to work in earnest. In the attempt many were shot dead, and others wounded; and as they fell, the survivors collected round the dead and dying, endeavouring to carry them off into the deeper parts of the forest. Three young ones were ultimately secured, which held so fast round the bodies of their dams that it required no small effort to detach them. They did not reach France alive. M. Rey remarks that this species of monkey greatly resembles the orang-outan in stature and inoffensive manners, inhabiting the mountains and tops of the loftiest trees, and living on fruit. Its fur he describes as being exceedingly fine. Some of the males measured, when standing upright, about four feet four inches in height.

ADDITIONS TO THE URSIDÆ.

1114.—The Rufous Coati.

(*Nasua rufa*). We have already alluded to the genus Nasua as one of those forms which link the Ursidæ, on one side, with the Mustelidæ, or Weasel tribe, of the other. The rufous coati in habits and manners agrees with the brown coati, living in pairs or small troops in the forests of South America, and climbing with great facility; but their mode of climbing does not resemble that of the cat or the squirrel, or of any of the light-limbed and sharp-clawed animals:—they do not run up a tree and bound from branch to branch, but proceed in the same heavy manner as on the ground; and it is because they can apply the palm of their paws, or the sole of their hind-feet, fairly to any object (not, however, grasping it), that they are enabled thus to climb. They use their feet, in fact, in the same manner as man, and their mode of climbing resembles his, except that their paws do not grasp; in descending, they generally come down hind-quarters foremost, carefully availing themselves of every projection. The bear always does so, and, as far as we have observed, the racoon also.

1115.—The Racoon

(*Procyon Lator*). We have little to add to our previous account of this species: Buffon, in speaking of the localities tenanted by the racoon, says, "This animal is originally from the southern regions of America: it is not found in the Old World; at least, travellers who have spoken of the animals of Africa and the East Indies, make no mention of it. It is, on the contrary, very common in the warm climates of America, and especially in Jamaica, where it inhabits the mountains, whence it descends to feed upon the sugar-canes. It is not found in Canada, nor in the other northern portions of this continent: nevertheless, it does not greatly fear the cold; M. Klein brought up one at Dantzick, and that which we had has passed a whole night with its feet locked up in the ice without experiencing any ill effects." As respects the racoon not inhabiting Canada, Buffon is most certainly wrong. It is even eaten in Canada, as we are positively informed by a gentleman who has seen it brought to the table. Dr. Richardson informs us that the racoon "inhabits the southern parts of the fur districts, being found as far north as Red River, in lat. 50°, from which quarter about one hundred skins are procured by the Hudson's Bay Company. If there is no mistake as to the identity of this species, the racoon extends farther north on the shores of the Pacific than it does on the eastern side of the Rocky Mountains. Dixon and Portlock obtained cloaks of racoon skins from the natives of Cook's river, in lat. 60°; and skins, supposed to be those of racoon, were also seen at Nootka Sound by Captain Cook. Lewis and Clark expressly state that the racoon at the mouth of the Columbia is the same with the animal so common in the United States." To this Dr. Richardson adds, "its flesh, when fed on vegetables, is reported to be good."

In captivity the racoon exhibits much cunning and a resentful temper. M. Blanquart des Salines, who kept one of these animals, states that a servant had one day struck his racoon a few blows with a whip: "in vain did the man afterwards attempt a reconciliation; neither eggs, nor food most coveted by the animal, availed in pacifying it. At his approach it enters into a sort of fury; with sparkling eyes it darts at him, and utters loud cries of suffering. Whatever is presented to it at that time, it refuses until its enemy has disappeared. Its accents of anger are very singular; sometimes one might fancy them the whistling of the curlew, at others the hoarse bark of an old dog. If any one beats it, or if it is attacked by an animal which it thinks stronger than itself, it opposes no resistance; like a hedgehog, it conceals its head and its paws, and forms its body into a ball: no cry escapes it, and in this position it would suffer death." With much caprice, there is no little cunning in the character of the racoon, mixed with malice and a fondness for destruction. The writer above quoted informs us that the chain of his racoon is sometimes broken, "and that liberty renders it insolent; it takes possession of a room, and will suffer no one to come near it; it is not without difficulty that it can be refettered. Since it has lived with me, its slavery has frequently been suspended. Without losing sight of it, I often allow it to walk with its chain, and every time a thousand little gambols express to me its gratitude. It is quite the contrary, however, when it escapes itself: it then rambles sometimes for three or four days together over the neighbouring roofs, and descends at night into the court-yards, enters the poultry-roosts, strangles the fowls and eats their heads, attacking more especially the Guinea fowls. Its chain did not render it more gentle, but only more circumspect: it then employed artifice, and familiarized the poultry with it,

permitting them to come and partake of its repast; and it was only after having inspired them with the greatest security, that it would seize a fowl and tear it to pieces. Some young cats have experienced from it the same sort of treatment."

ADDITIONS TO THE VIVERRIDÆ.

1116.—The Skunk

(*Mephitis Americana*, Sabine) We need add nothing to our previous account of this species, so celebrated for its disgusting odour; and respecting which Audubon, in his 'Ornithological Biography' (p. 310), gives, under the name of "Polecat," an amusing narrative, proving how long wearing apparel tainted with the odorous secretion preserves, spite of every attempt to remove it, the overpowering effluvium. Fig 1117 represents the dentition of the genus Mephitis, Fig 1118, the incisors and canines Fig 1119 represents the head of another species of the present genus (Mephitis dimidiata).

1120.—The Teledu

(*Mydaus meliceps*, F Cuv). In Java and Sumatra the Teledu holds the place of the skunks in America, and may be regarded as representing them it agrees with them in dentition and general habits, and the secretion of a fluid unsupportably disgusting

The teledu is considerably less than a badger in size, the ears are close and scarcely apparent (see the head of the Teledu, Fig 1121, the head is conical and the snout gristly at the tip and almost destitute of hair. The feet are remarkably strong, the toes, five in number, being united as far as the last joint, and armed with enormous claws especially those of the fore-feet The hair of the body is coarse, and rises to a peak on the occiput, that covering the neck being directed forwards The general colour is deep brown, a white stripe, beginning broad on the top of the head and back of the neck runs along the spine, and includes the short tuft-like tail The teledu is slow in its motions, and lives in burrows which it excavates in the earth. Notwithstanding its offensive odour, it is eagerly sought for by the natives who prize its flesh as food, which, if the animal be surprised and suddenly dispatched is almost entirely free from any offensive taint The following interesting account of this animal is from the pen of Dr Horsfield, who investigated its native regions "The mydaus meliceps presents a singular fact in its geographical distribution It is confined exclusively to those mountains which have an elevation of more than 7000 feet above the level of the ocean, on these it occurs with the same regularity as many plants The long extended surface of Java, abounding with conical points which exceed this elevation, affords many places favourable for its resort. On ascending these mountains, the traveller scarcely fails to meet with our animal, which, from its peculiarities, is universally known to the inhabitants of these elevated tracts, while to those of the plains it is as strange as an animal from a foreign country. A traveller would inquire in vain for the teledu at Batavia, Samarang, or Surabaya In my visits to the mountain districts I have uniformly met with it, and as far as the information of the natives can be relied on, it is found on all the mountains It is, however, more abundant on those which, after reaching a certain elevation, consists of numerous connected horizontal ridges, than on those which terminate in a defined conical peak Of the former description are the mountain Prahu, and the Tengger Hills, which are both distinctly indicated in Sir Stamford Raffles's map of Java It was less common on the mountain Gede, south of Batavia, on the mountain Ungaraang, south of Samarang, and on the mountain Tjen at the farthest extremity, but I traced its range through the whole island

"Most of these mountain ridges furnish tracts of considerable extent, fitted for the cultivation of wheat and other European grains Certain extra-tropical fruits are likewise raised with success, peaches and strawberries grow in considerable abundance, and the common culinary vegetables of Europe are cultivated to a great extent To most Europeans and Chinese a residence in these elevated regions is extremely desirable, and even the natives, who in general dislike its cold atmosphere, are attracted by the fertility of the soil, and find it an advantage to establish villages and clear the grounds for culture.

"Potatoes, cabbages, and many other culinary vegetables are extensively raised, as the entire supply of the plains on these articles depends on these elevated districts. Extensive plantations of wheat and other European grains, as well as of tobacco, are here found, where rice, the universal product of the plains, refuses to grow. These grounds and plantations are laid out in the deep vegetable mould where the Teledu holds its range as the most ancient inhabitant of the soil In its rambles in search of food this animal frequently enters the plantations, and destroys the roots of young plants, in this manner it causes extensive injury; and on the Tengger Hills particularly, where these plantations are more extensive than in other cultivated tracts, its visits are much dreaded by the inhabitants It burrows in the earth with its nose, in the same manner as hogs and in traversing the hills its nocturnal toils are observed in the morning in small ridges of mould recently turned up

"The Mydaus forms its dwelling at a slight depth beneath the surface, in the black mould, with considerable ingenuity. Having selected a spot defended above by the roots of a large tree, it constructs a cell or chamber of a globular form, having a diameter of several feet, the sides of which it makes perfectly smooth and regular, this it provides with a subterranean conduit or avenue, about six feet in length the external entrance to which it conceals with twigs and dry leaves During the day it remains concealed like a badger in its hole, at night it proceeds in search of its food, which consists of insects and their larvæ, and worms of every kind It is particularly fond of the common Lumbrici, or earth worms, which abound in the fertile mould The Teledu, agreeably to the information of the natives, lives in pairs, and the female produces two or three young at a birth"

When taken young, the Teledu is easily tamed, and perfectly inoffensive

Fig 1122 represents the skull of the Teledu Fig 1123 the teeth of the upper jaw Fig 1124, the teeth of the lower jaw The molars it will be seen consist, in the upper jaw on each side of two false a pointed carnassière, and a large and nearly square tuberculous molar, in the lower jaw of three false molars, a large carnassière and a very small tuberculous posterior molar Incisors and canines as usual

1125.—The Ferret

(*Mustela Furo*), Putorius Furo, Cuv Already described

1126.—The Weasel

(*Mustela vulgaris*), Putorius vulgaris, Cuv We need not enlarge our account of this animal, of which the habits are well known

1127, 1128.—The Ermine

(*Mustela Erminea*), Putorius Erminea, Cuv Fig 1127 represents this animal in its summer dress, Fig 1128 exhibits, in its winter livery of snowy white the tip of the tail remaining black—a beautiful contrast In this stage it is the ermine of the furriers

1129.—The Polecat

(*Mustela Putorius*), Putorius communis Cuv This species forms the type of Cuvier's genus Putorius, which he has, we think without sufficient reason exchanged for that of Mustela while on the contrary he has assigned the term Mustela as the sub generic name of the Martens, to which Ray had long since given the more appropriate name of Martes The latter name is adopted by Mr Bell in his 'British Quadrupeds,' who takes no notice of Putorius as applied to the polecats and weasels by Cuvier A needless alteration of names is ever to be avoided by the naturalist as tending not to simplicity and knowledge, but confusion and doubt.

1130.—The Pine Marten

(*Martes Abietum*). The principal differences between this and the Beech Marten consist according to Mr Bell, "in the greater length of the legs, and the smaller head of the Pine Marten its fur too, is more abundant, of a finer and softer texture and of a richer colour, and is consequently more highly valued, though it is not nearly equal to of the sable"

1131.—The Beech Marten

(*Martes Fagorum*) This is the most common of the two species in our country, excepting in certain districts We are not quite sure that they are not mere varieties of each other

Fig 1132 represents the dentition of Mustela (Putorius, Cuvier), which is as follows—Incisors $\frac{6}{6}$, canines, $\frac{1-1}{1-1}$, false molars, $\frac{2-2}{3-3}$, carnassière, $\frac{1-1}{1-1}$, tubercular molar, $\frac{1-1 \text{ trilobed}}{1-1 \text{ minute}}$ *a* represents the teeth of both jaws together

Fig 1133 represents the dentition of the genus Martes, which chiefly differs in the false molars which stand $\frac{3-3}{4-4}$ *a* shows the teeth of both jaws together.

ADDITIONS TO THE RODENTIA.

1134.—The Short-tailed Field-mouse

(*Arvicola agrestis*). Campagnol, Buffon, Arvicola arvalis, Selys-Longchamps. The short-tailed field-mouse (or Field-vole of Bell) is one of those Rodentia from which we often receive extensive injury, proving how necessary it is that, in order to keep their numbers within due bounds, an incessant warfare be maintained against them,—a warfare to which birds and beasts of prey are appointed.

This species is a native of the greater part of Europe, and is common in our island, where its depredations (and in France and other parts of the Continent the same may be said) have rendered it notorious. It is exclusively a tenant of woods, plantations, corn-fields, and meadows; and not unfrequently appears in enormous multitudes. Often is the farmer disappointed of his crop of wheat, the newly-sown grain having been all rooted up and devoured by an army of these "wee cowerin creepit timorous beasties," formidable not from their individual size, but their numbers Whole plantations of young trees have in like manner been destroyed, the root of every sapling being eaten, or the bottom of the stem barked round In the years 1813 and 1814 the ravages of these animals in the New Forest and the Forest of Dean were so great, as to create an alarm lest the whole of the young trees in those extensive woods should be destroyed by them In the first vol of the 'Zool Journal' is a letter from Lord Glenbervie to Sir Joseph Banks, entering into a detailed account of the devastations committed Mr Jesse, in his 'Gleanings,' referring to the plantations in these forests, says that soon after their formation, 'a sudden and rapid increase of mice took place in them which threatened the destruction of the whole of the young plants vast numbers of these were killed, the mice having eaten through the roots of five year-old oaks and chestnuts, generally just below the surface of the ground Hollies also, which were five or six feet high, were barked round the bottom, and in some instances the mice had crawled up the tree and were seen feeding on the bark of the upper branches In the reports made to government on the subject, it appeared that the roots had been eaten through wherever they obstructed the runs of the mice"

Various plans were adopted for their destruction, and in holes dug purposely to entrap them, in the Dean Forest alone, 30 000 mice were caught in about three months, and a much greater number destroyed by stoats, weasels kites, hawks, owls, crows, &c, and also by cats purposely turned out In the New Forest about the same number were also destroyed, and it was calculated that the total destruction, including those caught in pits and traps, and those killed by other animals, and by their own species (for when their food fell short they attacked and devoured each other), amounted in the two forests to more than 200 000

The field vole measures four inches one line in the length of the head and body, and one inch three and a half lines in that of the tail The fur is reddish brown above, grey beneath A distinct species, the Bank vole (Arvicola pratensis, Baillon, A riparia, Yarrell A rufescens, Selys Longchamps), is found on the Continent, and in some parts of England It is less than the former species with a longer tail, and differs in several particulars in its internal anatomy.

1135.—The Porcupine

(*Hystrix cristata*) To our account of the Porcupine, p 70, we may add that Col Sykes regards the porcupine of the Dukhun, called 'sayal" by the Mahrattas, as distinct from the ordinary species It is nearly a third larger, and all the spines and tubes of the tail are entirely white, the spines are also so long as to reach the insertion of the tail The ears are much less rounded, and the nails shorter and stronger We have compared skulls of the common Indian and African porcupines together in the Paris Museum, and other bones of the skeleton, and we perceived a marked difference in many details To the Indian species or variety Col Sykes has given the title H Leucurus, it is very abundant and good eating Like the African porcupine, when alarmed or irritated it shakes the tubes and spines of its tail violently producing a startling noise It stamps also with great energy, and when it assails an adversary it runs obliquely backwards, transfixing the foe with its spine (See 'Cat Mamm of Dukhun,' p 10, and 'Zool Proceeds.' 1831, p. 103)

ADDITIONS TO THE CARNIVORA.

1136.—A Tail-piece.

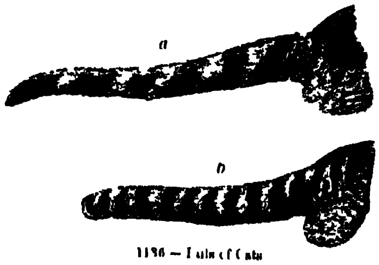
In our description of the wild cat, which we have stated to be specifically distinct from the domestic species (see p 7), we alluded, amongst other points, to the difference of the tail We here give, *a* the tail of a domestic cat which had betaken itself to the woods, leading an independent life, and *b*, the tail of the true wild cat (Felis catus).

1129 —Polecat

1131 —Beech Marten

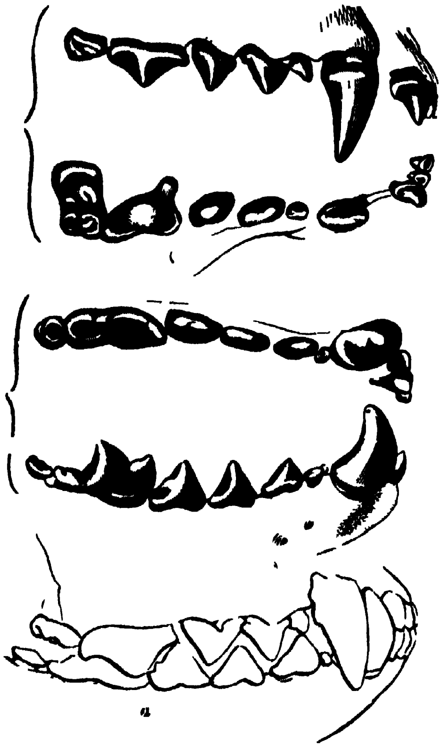
1130 —Pine Marten

1135 —Porcupine



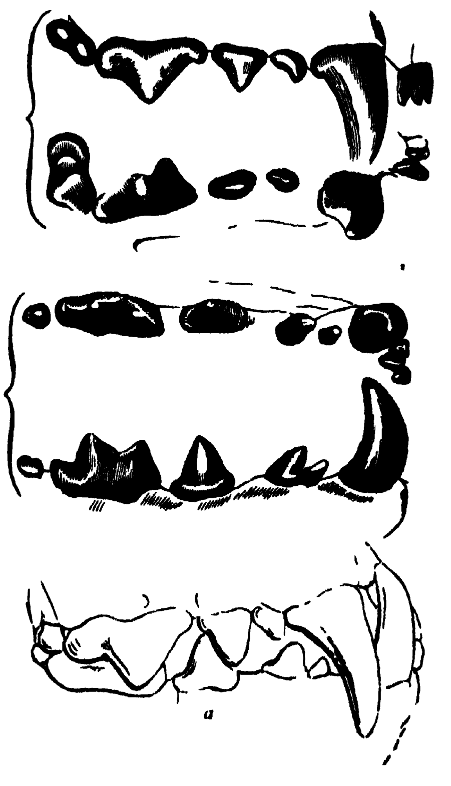
1136 — Tails of Cats

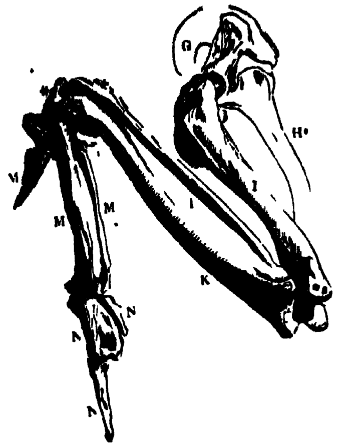
1134 —Short tailed Field Mice



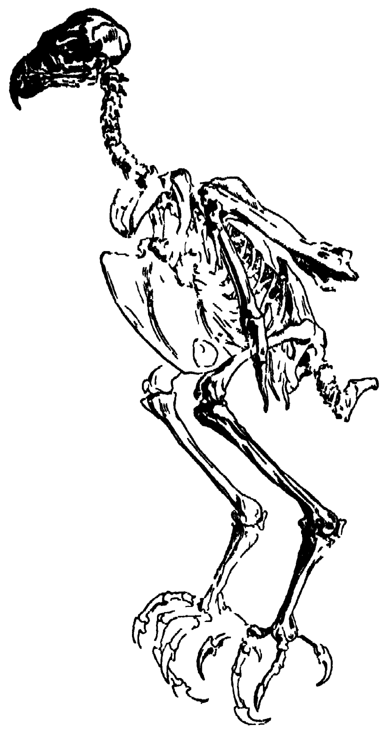
1132 T[illegible]

1128 —Ermine Winter Dress

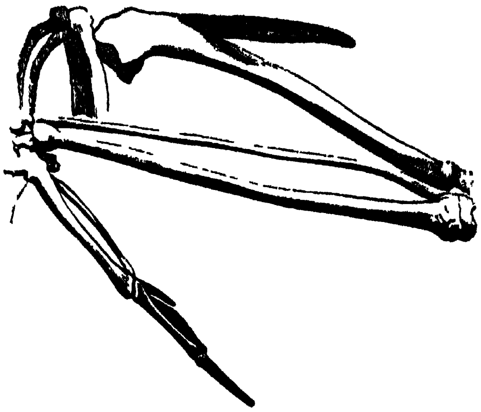




1140.—Bones of Hawk's Wing

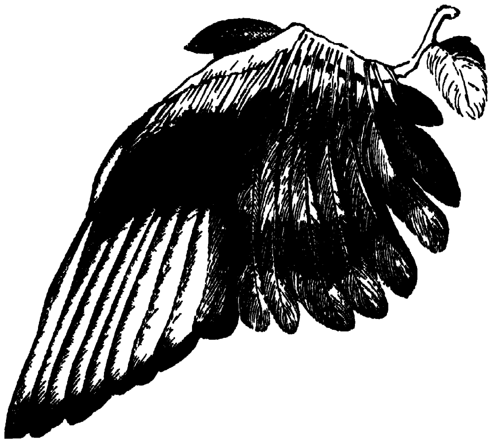


1137.—Skeleton of Hawk



1139.—Bones of Hawk's Wing

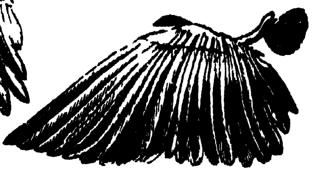
1143.—Wing of Curlew



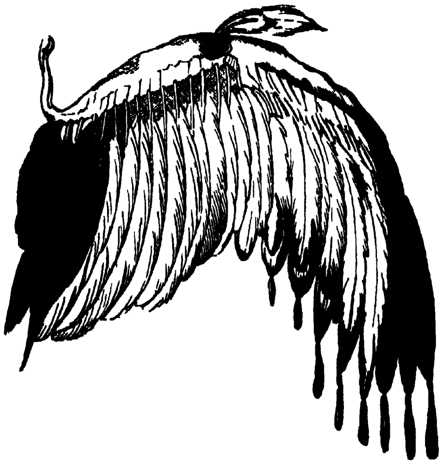
1148.—Wing of Magpie

1145.—Wing of Grosbeak

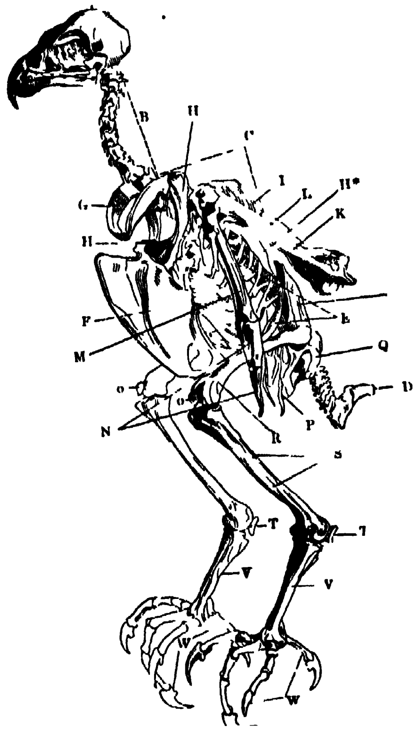
1146.—Wing of Chaffinch



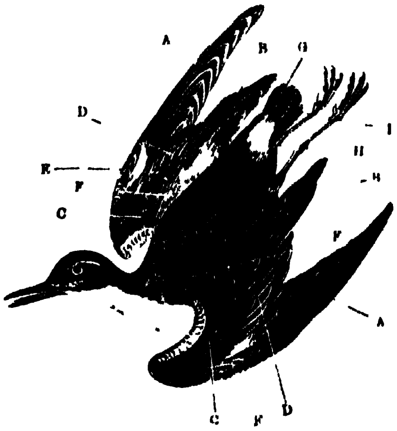
1147.—Wing of Sparrow,



1149.—Wing of Chinese Jacana

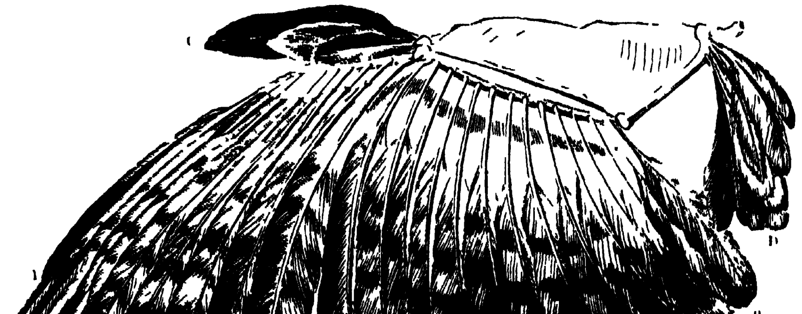


1138.—Skeleton of Hawk

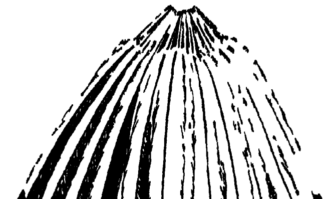


1141.—Plumage of Bird

1144.—Tail of Buzzard.



1142.—Wing of Buzzard (partly stripped.)



1150.—Tail of Kestrel.

CLASS AVES.

(BIRDS.)

is, perhaps, no class of the animal kingdom more generally interesting than birds; and not without reason. Their infinite variety of form, habits, and manners; their plumage, always beautiful, often rich and gorgeous; their aerial endowments; their nidification; their voices; the bittern's boom, the cawing of busy rooks, the cock's shrill clarion, the thrilling lay of the skylark, or the rich strains of philomel—nay, even the hoarse cries of those that tenant moorland and morass, fen or lake, or wheel in buoyant flight over the broad expanse of ocean;—these all combine to throw a halo of attraction around them, heightened by associations which in every mind hold an abiding sway, and often inspire it with sentiments of affection.

Having said thus much, let us turn to Figs. 1137 and 1138, both of which represent the skeleton of a hawk. A, the skull; B, cervical vertebræ; C, the dotted lines indicate the extent of the anchylosed vertebræ of the back; D, the caudal vertebræ—the latter is placed on the ploughshare; E, the ribs; F, the breast-bone; G, the furcula, or merrythought; HH, the clavicular or collar-bone; H*, the scapula, or shoulder-bone; I, the humerus; K, L, the bones of the fore-arm, ulna, and radius; M, metacarpus of hand; N, phalanges of fingers; O, P, Q, the pelvic bones; R, the femur or thigh-bone; *o*, *o*, the patella or knee-pan; S, the leg, tibia and fibula; T, T, the os calcis, or heel-bone; V, V, the metatarsal bones; W, W, the toes. Fig. 1139 represents the bones of the wing. Fig. 1140, the bones lettered; G, outline of the furcula; H*, outline of part of scapula; I, humerus, or arm-bone; K, the ulna; L, the radius, both forming the fore-arm; **, carpal or wrist bones; M, M, metacarpal bones; *M, the thumb; N, N, N, the phalanges of the fingers.

Now, in imagination, let us clothe our skeleton with muscles and skin, and dress that skin in its natural clothing of feathers. These are all arranged in due order, and those of many parts, especially of the wings and tail, have received names, with which the student of ornithology must make himself acquainted. Fig. 1141 represents a bird displayed to show its plumage: A, A, are the primaries, or great quill-feathers of the wings, which are succeeded by the secondaries, and these by the tertials, B, B; C, C, are the lesser coverts; D, D, the greater coverts; E, E, the bastard wing, or winglet; F, F, the scapularies; G, the upper tail-coverts; H, the under tail-coverts; I, the tail-feathers (rectrices).

In order that the arrangement of the feathers of the wings may be the better understood we refer to Fig. 1142, the wing of the common buzzard, stripped of all its feathers, excepting those which give it power and expanse, and which are those arising from the hand and the ulna, and termed quill-feathers. They form two sets. The first set, A, A, A, consist of those arising from the hand (metacarpus and phalanges), and constituting the most important of the series, being mainly instrumental, by their length and shape, their stiffness or flexibility, in determining the character or the power of their flight. They are termed the primaries, or primary quill-feathers, and are ten in number, but they differ in form as well as in relative length. The second set arise exclusively from the ulna, and are termed the secondaries, or secondary quill-feathers, B: they are usually shorter, broader, and less rigid than the former; their number varies. From the small bone which represents the thumb, arise certain short stiff feathers, lying close upon the quills of the primaries, and constituting the spurious wing or winglet, C. Besides these, there is a group of feathers, termed tertiaries, arising from the humeral joint of the fore-arm, and which in many birds, as the curlews, plovers, lapwings, &c., are very long, forming a sort of pointed appendage, very apparent during flight: in most birds, however, they are very short, or not to be discriminated from the rest of the greater coverts, of which, in fact, they are a continuation; hence they cannot strictly be reckoned among the quill-feathers. The same observation also applies to the feathers, D, attached to the upper part of the humerus, and termed scapularies; these lie along the sides of the back, and in many birds are of great length. The position of these feathers, and of the coverts, will be seen in the annexed sketch, Fig. 1143, which is the expanded wing of a curlew: A, a series of feathers termed the lesser coverts, disposed in scale-like order, row after row, on the fore-arm and carpal joint; they cover the barrels of the quill feathers; below them extends a series of larger feathers, B, which sweep across the wing, encroaching far on the primaries, and when the wing is closed usually hiding the secondaries; these are the greater coverts, of which the tertiaries are to be regarded as a continuation. The under surface of the wing is lined with softer feathers, termed under-coverts.

We have said that the last bone or ploughshare of the caudal vertebræ, and which is more developed than the others, supports the tail-feathers, the quills of which are fixed in capsules; it is also furnished with powerful muscles, for the purpose of acting on these feathers, for they are capable of being expanded (as in the turkey-cock) or closed, elevated or depressed. The terminal joint of the tail merely stripped of its feathers, is, as we know, somewhat heart-shaped, owing to the muscles, which are contiguous to the bone, and to the lateral arrangement of the capsules for the reception of the quills of the tail-feathers. The mechanism of the tail of the common fowl will convey a good idea of the subject. The tail-feathers vary in size, length, shape, and strength, in various groups or genera; they vary also in number; their usual number, however, is twelve; sometimes they amount to fourteen, and in the Gallinaceous tribes to eighteen, or even more. The tail-feathers of the common buzzard (Fig. 1144) afford a good illustration of their ordinary arrangement. Six on each side are disposed one above another, and they partially overlay each other, the lateral one on each side being overlaid by the next in succession, and so on to the centre; of the two central feathers one overlays the other. The quills of the tail-feathers are hidden beneath what are termed the upper tail-coverts, which in some birds, as the peacock, the resplendent trogon (Trogon resplendens, Gould), &c., form long flowing plumes of exquisite beauty. Beneath the quills of the tail-feathers are covered by under tail-coverts, consisting of lax feathers, and in some birds, as the marabou, forming plumes of great softness and delicacy. Occasionally, indeed, as in the ostrich, the menura superba (lyre-bird of Australia), and others, the tail-feathers themselves lose their ordinary character, and are soft, lax, and flowing; thereby adding beauty to the bird.

It must be evident that the shape, arrangement, and texture of the feathers composing the wings and tail must materially affect the flight of birds, both as it respects rapidity and peculiar character. Of all birds, the swift (Cypselus) and the humming-birds are the most remarkable for the rapidity of their aerial movements: let us attend to the character presented by their wings.

We are at first struck with the length of this organ in comparison with that of the bird itself; but we see also that its breadth is not in proportion to its length, and that its general form is somewhat like that of a sabre. This, however, is not all; the wing appears to consist exclusively of primary quill-feathers, so greatly are these developed, and so small, comparatively, are the secondaries: the first primary quill-feather is the longest; the others shorten in gradual order, so that the wing is pointed. Now we may here observe that a pointed form of wing is essential to rapidity of flight; we see this principle exemplified in the true falcon, in the pigeon, in the swallow, the pratincole, birds of great powers of aerial progression. In a pointed wing the first or second quill-feather is always the longest, but sometimes the second and third are equal. In a pointed wing the primaries greatly exceed the secondaries.

To revert, however, to the wing of the humming-bird, there is something in the texture of the feathers composing it which must not be overlooked. A rapid flight supposes a succession of smart blows upon the air, which it is evident cannot be given by yielding, downy plumes. Now the feathers composing the primaries in the humming-bird consist of a thick, elastic, taper shaft, in some species developed to an extraordinary degree at the base, as in the blue-throated sabre-wing (Campylopterus latipennis, Swains.): the vane on each side of the shaft is narrow, firm, and rigid, as if made of a thin plate of burnished metal; this appearance is produced by the minuteness of the plumelets of which the vane is composed, and by their closeness to each other, and the firmness with which they are united together. The wings thus present a firm resistance to the air, and, as they are rapidly agitated, produce a humming sound. The wings of the falcon, pigeon, &c., though not composed of feathers so rigid nor so metal-like in structure as in the humming-bird, are nevertheless very beautifully adapted as regards the texture and elasticity of the primaries for velocity; and we may set it down as a rule, that wherever a long and pointed wing is found, the primaries will be firm and elastic. The wings of birds of rapid flight are seldom very concave beneath,—on the contrary, they are almost flat, when extended; and this flatness, while it contributes to the velocity of motion as the bird sweeps along, destroys the power of a direct upward ascent, which is possessed in far greater perfection where the wings are at once ample and concave. The falcon, in order to soar, is obliged to sweep round in circles, or to fly against the wind, and he thus rises obliquely, on the same principle as is shown in a flat piece of tile or an oyster-shell thrown smartly against the wind.

Wings somewhat rounded, concave, ample, and composed of stiff and well-formed quill-feathers, while inferior in some points as organs of flight, are superior in others; they enable their possessor to soar, with ease, and to sail with graceful freedom in the higher regions of the air. This form of wing is exemplified in the condor: it may be observed, that though the concavity of these ample wings aids in soaring, it obliges the bird in descending to sweep down in a series of gyrations, each circle contracting, till the bird gains the ground.

Where the wings are concave, as in the owl, and composed of lax, soft feathers (the whole of the plumage being full and downy), the flight is buoyant, noiseless, wheeling, and differing altogether in character from that of the falcon or swallow. The feathers yield too much and are too soft, to produce any whistling or rushing noise in flight; no rigid edges cut the air, the vanes of the quill-feathers are lax, and the outer edge of the first, instead of being plain, is fringed with a line of short lashes (the prolonged terminations of the plumelets composing the vane), as if to guard against the least possibility of sound being produced by the winnowing of the air.

Concavity of wing joined with shortness and roundness, is unfavourable to flight. Birds with this form of wing are for the most part terrestrial in their habits; their bodies are heavy, and their great powers reside in the legs; the common fowl or the turkey are examples in point. There are, however, such modifications among terrestrial birds in the structure of the wings as to render some far superior in flight to others. The wings of the common partridge, for instance, are short, round and concave, and its flight is necessarily short, whirring and destitute of ease; but, on the other hand, the quail, its immediate ally, in consequence of a somewhat more lengthened and pointed form of the primaries, possesses, if not great, at least tolerable powers of flight, and is one of our birds of passage.

As illustrations of wings, Fig. 1145 represents that of the common Grosbeak; Fig. 1146, that of the Chaffinch; Fig. 1147, that of the common Sparrow; Fig. 1148, that of the Magpie; Fig. 1149, that of the Chinese Jacana, in which the primaries have narrow plumose appendages at the tips.

With respect to the wings of the sparrow, grosbeak, and chaffinch, it will be observed that their form is moderately pointed; still, however, the flight of these birds is not remarkable for velocity; for, in the first place, the extent of wing does not bear that comparative relationship to the size of the body which it does in the falcon, vulture, or swallow; and in the second place, the quill-feathers are destitute of firmness, the shafts are weak, and the vanes are soft and flimsy; while at the same time the primaries but little exceed the secondaries, so that the breadth of the extended wing is half, or more than half of its length.

The crow and rook have ample and moderately pointed wings; the first quill-feather is much shorter than the second and third, these being exceeded by the fourth, which is the longest; they are firm and elastic. The flight of these birds is steady, and they sail with ease, often at a very great elevation, and sometimes perform a series of rapid evolutions, wheeling, diving, and as suddenly re-ascending. Allied to the crow and rook (Corvus), the magpie differs materially from them in its mode of flight, and in the figure and proportion of its wings. The wing of the magpie is short and rounded; the first quill-feather is narrow, and about half the length of the second; the fourth and fifth, which are nearly of equal length, are the longest in the wing. "Magpies and jays," says White, "flutter with powerless wings, and make no despatch." The flight of the magpie is supported by short quick strokes.

Some birds have appendages of various kinds to their wings, the uses of which cannot well be accounted for. In the Chinese jacana, for instance, the tips of the primaries are furnished with slender narrow plumes or appendages. In some of the night-jars we have a singular development of plumes. In the Leona night-jar, from the midst of the wing-coverts issues a long elastic shaft to the extent of twenty inches, and tipped for about five inches with a broad web. In another species, from Sierra Leone, the ninth quill-feather is produced to an amazing extent, running narrower as it proceeds, and is soft and flowing. In many birds the tertials are produced into pendent plumes of great length, which fall gracefully down and almost touch the ground, as we see in the Demoiselle and the Stanley cranes. The tertials of the common crane also form elegant plumes, each feather drooping with dishevelled barbs; the tertials of the sacred ibis are also produced into lax plumes. In the egret the scapularies are elongated into wavy plumes, the feathers having their vanes composed of long filamentous plumelets or barbules distant from each other. In the cranes, herons, egrets, &c., the wings are long and ample.

Some birds, as we have observed, are very inferior in flight to others, their wings being modified accordingly; but there are not only birds incapable of easy and graceful progress through the air, but there are some which are utterly destitute of the power of flight, even in its lowest degree. There are two conditions of wing connected with the want of this power: first, that in which the wing is simply undeveloped, both as respects osseous structure, muscles, and feathers — as in the ostrich, cassowary, &c.; secondly, that in which the wing is converted into an organ of aquatic progression — as in the great auk, but more particularly in the penguin, which has its paddle-like wings furnished with close, minute, rigid feathers resembling scales.

From the leading modifications exhibited in the wings of birds, we turn to those presented by the tail, the osseous structure of which, with the mode in which the feathers are ordinarily arranged, has already been pointed out. Even more numerous than those of the wings are the diversities of form and size presented by this organ, diversities more or less directly influencing the character of the flight. In some instances the tail is reduced to a mere rudiment, or is even wanting, and in others it is large and of great length. Nor is it only from its form or size that the tail of the feathered race influences the peculiar manner of flight; the texture and quality of the feathers themselves are of great importance. Where the tail consists of soft plume-like feathers, we may at once set it down that the bird thus furnished is ill adapted for aerial progression; and it will be found, moreover, that the structure of the wings and the nature of the general plumage will invariably correspond with the characters of the tail; for wings well calculated for aerial progression, and a tail unadapted for it, would be a violation of the laws of Nature, there being no contradiction of parts and purposes in her ways. On the contrary, if the feathers of the tail be firm and the barbs close — though the tail itself may not be very ample — it will be of great avail. There are many examples of birds with small tails being endowed with surprising powers of flight; indeed in most birds of rapid flight, the wings when closed advance with their points to the end of the tail, or even pass beyond it; we may mention the peregrine falcon and the swift; in the latter bird the tail-feathers are only ten in number, and are far exceeded by the wings when closed. Where, however, the tail is much reduced, as in the kingfisher, its rudder-like power is evidently diminished, and though the flight may still be rapid, it is necessarily straight and arrow-like, there being no power of sailing in easy circles, or of making abrupt turns and doubles, as we see in the kite on the one hand and in the swallow on the other.

We need hardly say that in the act of flying birds expand their tails, and thus the extent of surface is increased to their manifest advantage. Where the wings are ample and the tail ample at the same time, the flight is easy and graceful; where the tail is short and the wings long and vigorous, the flight is generally rapid and impetuous; but where the tail is long and ample, and the wings rounded and short, as in the magpie, the flight is laborious. The principal forms assumed by the tail are as follows: 1, square or even; 2, rounded; 3, graduated regularly (every feather advancing in due degree) or irregularly (some advancing to an extreme beyond the others); 4, slightly forked with rounded points; 5, more or less deeply forked with acute points; 6, plumose.

The size of the tail varies under every modification of form, and the forms themselves differ to a considerable degree as it regards a very [illegible] number of minute particulars; the feathers also composing the tail exhibit an infinity of differences, both in form and texture.

As examples of some of the principal forms in the tail of birds, we select the following illustrations: Fig. 1150, the tail of the Kestrel spread out; Fig. 1144, the tail of the common Buzzard; Fig. 1151, the tail of a species of Humming-bird; Fig. 1152, the tail of the Heron; Fig. 1153, the tail of the Sandpiper; Fig. 1154, the tail of the Coot; Fig. 1155, the tail of the Pied Wagtail; Fig. 1156, the tail of the Magpie; Fig. 1157, the tail of the Chaffinch; Fig. 1158, the tail of the Lark; Fig. 1159, the stiff rudder-like tail of the Cormorant; Fig. 1160, the scansorial tail of the Tree-creeper.

Having thus spoken of the arrangement of the feathers, which, it may be added, the bird moults and renews at certain seasons, we proceed to explain the different parts of a feather itself. A feather consists of a stem (scapus), divided into the barrel or hollow base (calamus), in which the nutrient vascular pulp was originally contained, and which remains shrivelled as a pith; the shaft (rachis), and the web or vane on each side (pogonium), which consists of numerous barbs (radii pogoniorum) closely interlocked (at least usually) by means of minute processes called barbules (radioli). In many feathers the base of the web consists of loose, free, soft barbs; and there is frequently an accessory plume at the base of the shaft, generally a downy tuft, but sometimes almost as much developed as the feather from which it emanates, as in the emu, in which bird each feather seems double, with one barrel.

There is no external auditory apparatus, but the orifice to the internal auditory apparatus is covered with a tuft of close feathers; sometimes, however, as in the owl, there are external membranous valves, capable of being opened or closed at will. The sense of hearing is acute. The jaws of birds are invested with a horny sheath forming a beak differently modified in different groups. In the parrots the upper jaw (or mandible) is articulated to the skull in such a manner as to be freely moveable.

In many birds the base of the upper mandible is clothed with a tough skin called the cere, in which the nostrils are placed, but the situation of these greatly varies. Between the base of the beak and the eye a naked space called the lore (lorum) often intervenes.

With respect to the eye of birds, we may observe that the bony orbits are capacious and the organs seated therein of according magnitude. In birds of prey the general shape of the eye is that of a bell, or chalice; the cornea, which is very convex, forms the bottom of the chalice, the posterior segment of the sclerotica its cover. This peculiar form (see Fig. 1162) arises from the curvature and length of the bony plates which, as in all other birds, occupy the front of the sclerotica, lying close together and overlapping each other. These bony plates form a flat or slightly convex ring; but in the rapacious birds they form a concave ring, which gives to the eyeball the above-mentioned form. By means of this ring the eye becomes a kind of self-adjusting telescope, so as to take in both near and very distant objects.

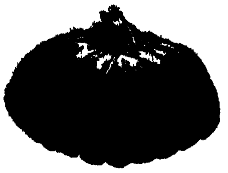
A representation of the sclerotic plates forming the bony ring in the eye of the penguin (Aptenodytes) is represented at Fig. 1161. They remind us forcibly of the eye-plates in some of the reptiles, particularly of those belonging to the eyes of the Enaliosaurians or fossil marine lizards. The penguin has to adjust its eye for vision both on land and under water. This contrivance must greatly assist the adjustment necessary for seeing clearly in such different media.

The crystalline humour is flat in birds, and the vitreous humour is very small. The colour of the iris varies in different species, and in many cases is very brilliant. The marsupium, which arises in the back of the eye, and the use of which is not very clearly ascertained, is a peculiarity in the eye of birds. They have three eyelids, two of which, the upper and lower, are closed in most of the race by the elevation of the lower one, as may be frequently seen in our domestic poultry. The owl, the goat-sucker, and a few others have the power of depressing the upper eyelid. Of these birds the upper only is furnished with eyelashes generally; the ostrich, secretary vulture, some parrots, and a few other birds have them in both lids. But the third eyelid, or nictitating membrane, forms the most curious apparatus. When at rest, this, which is a thin semi-transparent fold of the tunica conjunctiva, lies in the inner corner of the eye with its loose edge nearly vertical. By the combined action of two muscles which are attached towards the back of the sclerotica, it is capable of being drawn out so as to cover the whole front of the eyeball like a curtain, and its own elasticity restores it to the corner in which it rested. This, it is said, enables the eagle to look at the sun. It may be seen in operation to much advantage in the Great South American Eagle (Harpyia destructor) at the gardens of the Zoological Society in the Regent's Park.

Fig. 1162 shows the section of the eye of the owl: *a*, the quadrangular bony scale within the substance of the sclerotic, giving it firmness; *b*, an expansion called the ciliary body, extending over the whole of the inner surface; *c*, a curious membrane called the pecten, projecting through the choroid into the vitreous humour, and in some birds attached to the side of the lens: of its use little is known. Fig. 1163 shows the orbit turned so as to expose the recti and other muscles. Fig. 1164 shows the posterior view of the eyeball; Fig. 1165, a lateral view of the same. These show the two muscles which originate from the sclerotic, and are applied to its curved surface round the entrance of the optic nerve (Fig. 1164, *a*). The larger represents rather more than half of what if completed would be a broad circular ring (Fig. 1164, *b*): it is called the quadratus. Attached by its wider edge, near the margin of this part of the sclerotic, its fibres converge to the narrower edge, and terminate in a narrow tendon (Fig. 1164, *c*), perforated through its whole length like the hem of an apron. The second smaller muscle, called the pyramidalis, from

1152.—Tail of Heron

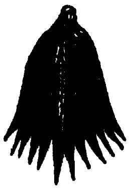
1151.—Tail of Humming bird.

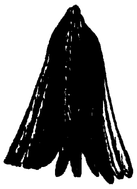

1154.—Tail of Coot.

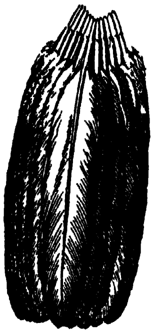
1153.—Tail of Sandpiper

1156.—Tail of Magpie

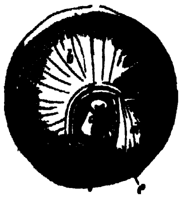
1155.—Tail of Pied Wagtail

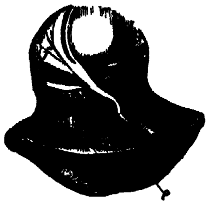

1158.—Tail of Lark.

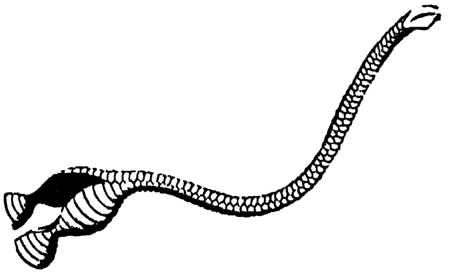

1157.—Tail of Chaffinch

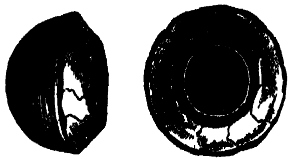

1159.—Tail of Cormorant

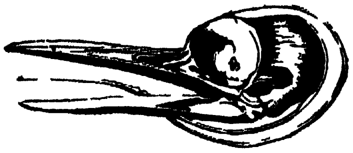
1160.—Tail of Tree-creeper

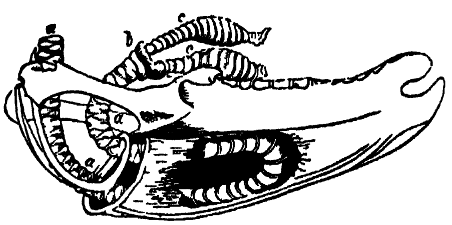

1164.—Eyeball of Owl posterior view


1165.—Eyeball of Owl lateral view.

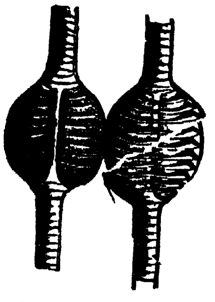

1170.—Windpipe of Bittern

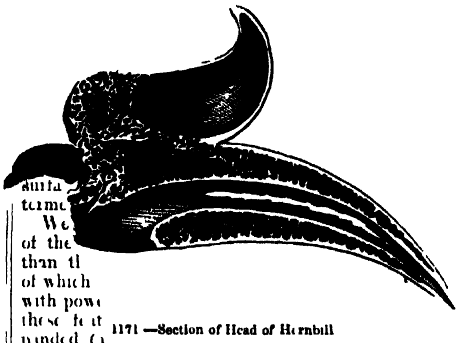

1161.—Sclerotic Plates of Penguin


1166.—Skull and Tongue of Woodpecker



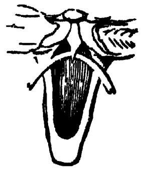
1167.—Breast bone and Windpipe of Wild Swan

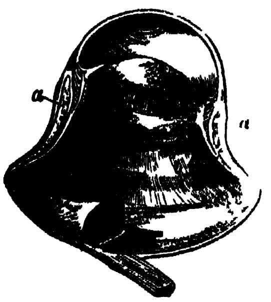

1169.—Part of Windpipe of Wild Swan.


1171.—Section of Head of Hornbill

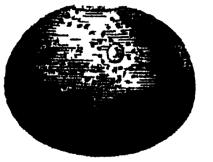
its the
ttered,
art of
t, the
or
b,

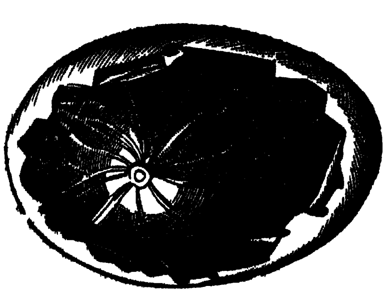
sulta
terme
We
of the
than tl
of which
with pow
these fe t
punded (
or depress

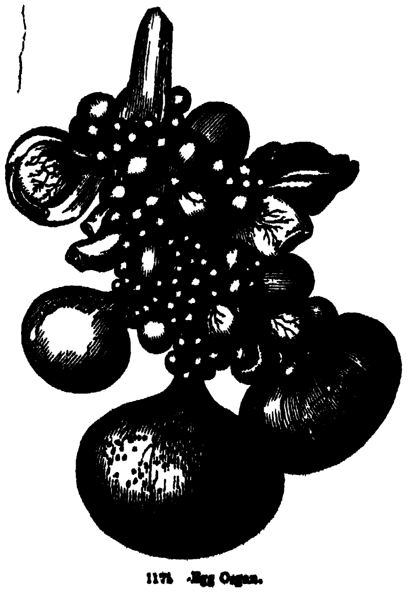

1168.—Point of Keel-bone of Wild Swan.

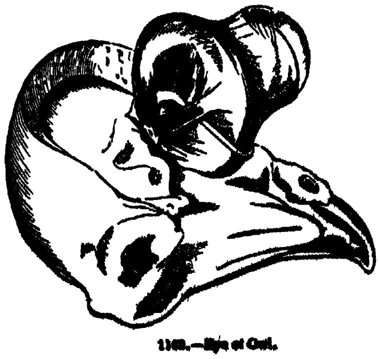


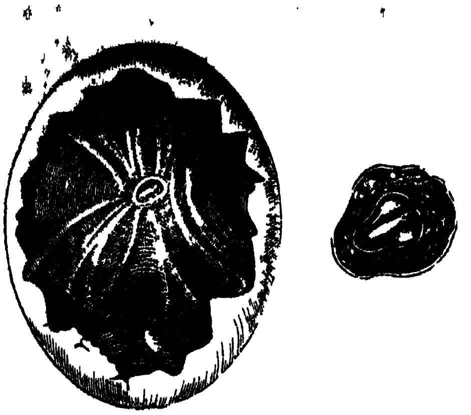
1162.—Section of Eye of Owl


1173.—Vivified Egg

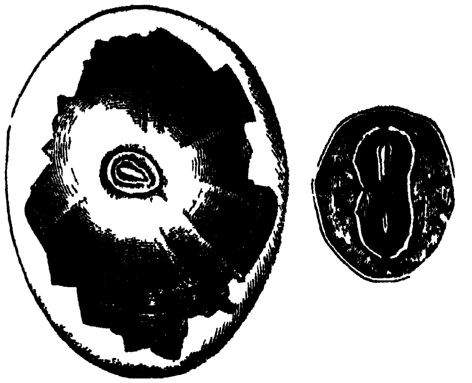

1174.—New-laid Egg, with part of Shell removed


1175.—Egg Organ.

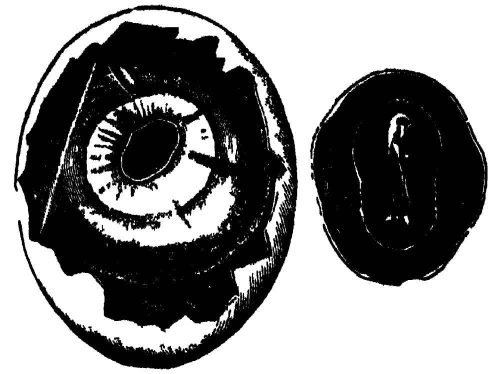

1163.—Eye of Owl.



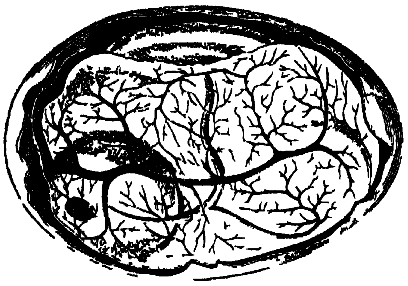
1175 —Egg and Germ at Twelve Hours after Incubation



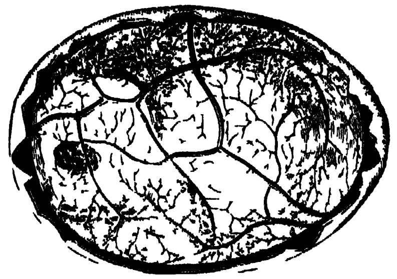
1176 —Egg and Germ a



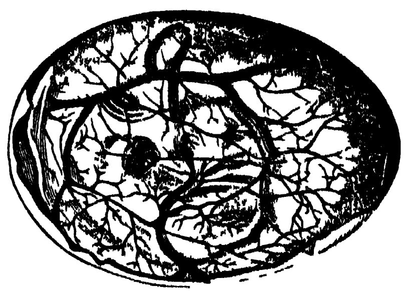
11[illegible] —Egg and Germ at Thirty six Hours



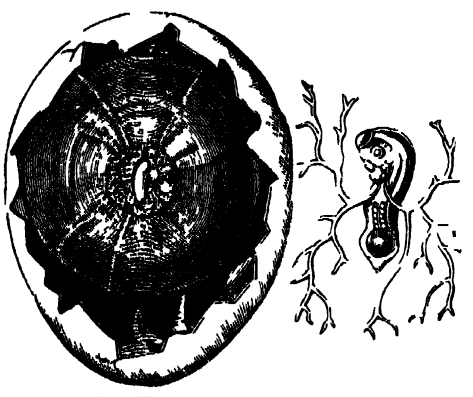
1184 —Egg on Ninth Day



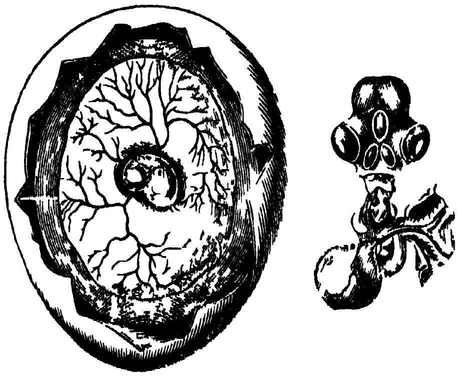
1[illegible].—Egg on Ninth Day turned to the Right.



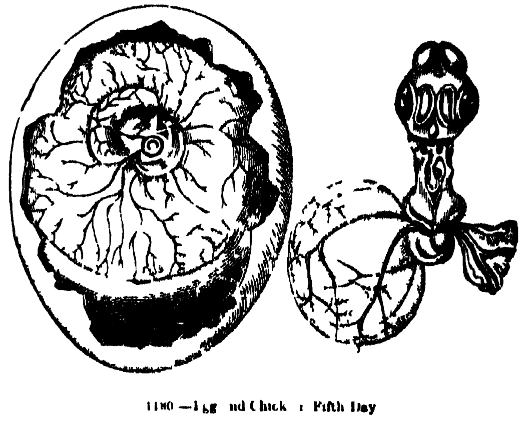
1186.—Egg on Tenth Day



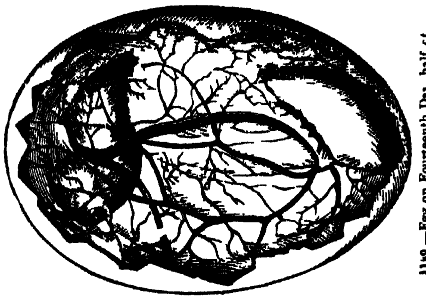
1178—Egg and Chick at Thirty six Hours



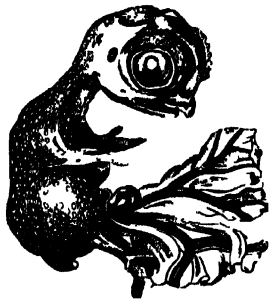
1179 —Egg and Chick on Fourth Day



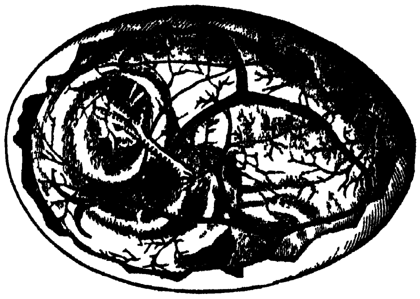
1180 —Egg and Chick on Fifth Day



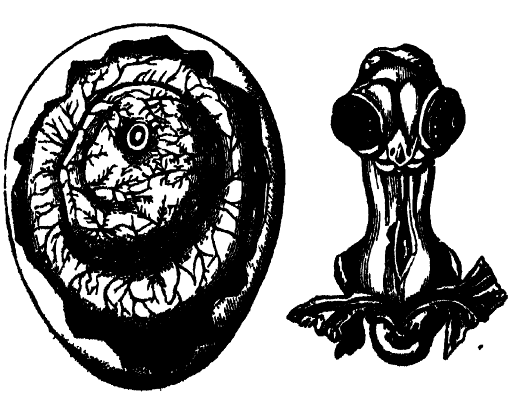
1189 —Egg on Fourteenth Day half of vesicle removed



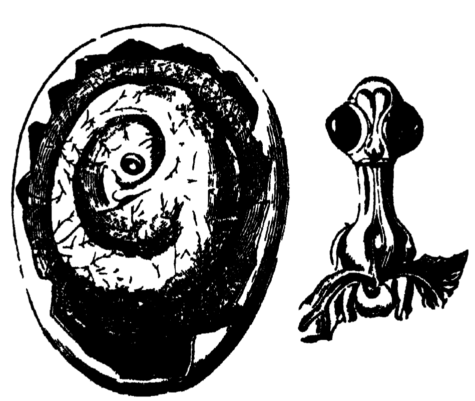
1187 —Chick at Ten Days



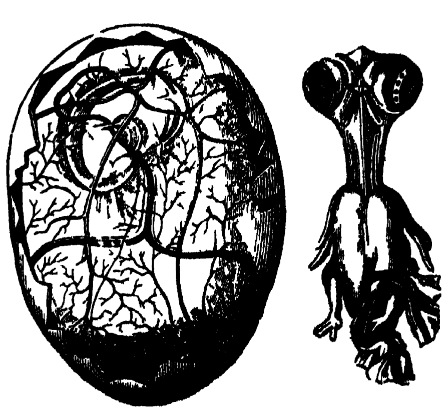
1188 —Egg on Fourteenth Day



1181.—Egg and Chick on Sixth Day.



1182.—Egg and Chick on Seventh Day



1183 —Egg and Chick on Eighth Day.

its shape (Fig. 1164, *d*) at an opposite part of the circumference. Its fibres converge, and are fixed into a long round tendon (Figs. 1164 and 1165, *e*), which passes through the loop or hem (*c*) of the quadratus, and hence turning over the edge of the broad part of the sclerotic, is continued along the surface of its bell-shaped portion, where it passes through several thread like loops or pulleys which keep it applied to the concavity, and round a bony point which projects from the surface, and is attached near the edge of the cornea to the edge of an elastic fold (Fig. 1165, *f*) of the conjunctiva, which is called the third eyelid, or nictitating (*i. e.* winking) membrane. It will be easily seen by the help of the figures, from this description, that the effect of the simultaneous contraction of the two muscles will be to draw the membrane with great rapidity, making it sweep over the surface of the cornea. It returns by its own elasticity with nearly equal quickness. A bird may be seen to use this mechanism twenty times in a minute; in fact, as often as it may be necessary to cleanse the surface of the eye. The colour of the membrane is milky; and it is seen to pass from the upper and inner to the outer and lower corner of the eye with the speed for which the act of winking is proverbial.

Though all birds possess a tongue, it is probable that but few find enjoyment in the organ as ministering to their taste; and in those it is soft, thick, and covered with papillæ. Some of the birds of prey, some of the swimmers, and the parrots generally, have such a tongue, and there can be no doubt that these taste food of a soft or fluid nature and select that which they like best. But in general the tongue is horny and stiff, and appears unsuited to convey such impressions though as an organ for taking food it becomes of the highest importance. In the humming-birds and other honey suckers it is a tubular pump, and in the woodpeckers it is an insect-spear. In both cases it can be protruded and retracted at pleasure; and the simple but beautiful machinery by which this act of volition is performed is adapted with the most masterly fitness to the motion required. Upon examining the tongue of the common green woodpecker (Fig. 1166), we shall find that, instead of being very long, as it is erroneously supposed to be, it is really very short, sharp-pointed, and horny, with barbs at its sides. Behind this lies the singular tongue bone (os hyoides), slender, and with two very long legs or appendages (crura). This is made up of five parts, consisting of a single portion and two pairs of cartilages. Let us suppose the tongue to be at rest, and then the single piece lies in a fleshy sheath, capable of great extension. To this piece the first pair of cartilages, which are situated at the sides of the neck, are joined; while the second pair, springing from these, run under the integuments completely over the skull, and, advancing forwards, converge in a kind of groove, terminating generally in the right side of the upper jaw. This second pair by their elasticity become the springs which set the whole in motion. When the organ is to be protruded, the anterior pieces are drawn together, and enter the extended sheath of the single piece; the tongue is thus elongated as it were, and the bird can thrust it far forth.

The organs of the voice in birds bear a striking resemblance to certain musical wind-instruments. The larynx is double, or, rather, made up of two parts, one the proper rima glottidis, situated at the upper end of the windpipe, and the second, the bronchial or lower larynx, which contains a second rima glottidis furnished with tense membranes that perform in many birds (and especially in the aquatics) the same part as a reed does in a clarionet or hautboy, while the upper rima, like the ventage or hole of the instrument, gives utterance to the note.

The length of the windpipe and the structure of the lower larynx vary much in different species and even in the sexes, particularly among the water-birds. In the domestic or dumb swan the windpipe is straight; in the male wild swan (Cygnus Bewickii) the windpipe is convoluted in the hollow of the breast-bone like the tube of a French horn.

See Fig. 1167, the breast bone, with part of the keel removed to show the convolutions of the trachea within; Fig. 1168, the point of the keel, showing the opening through which the trachea enters and returns; Fig. 1169, part of trachea of Cygnus Bewickii; Fig. 1170, the trachea of the bittern.

The following are the conclusions of M. Jacquemin, in his paper lately read before the French Academy; and though many of the facts were previously known, M. Jacquemin's communication must be considered as a valuable addition to this part of the subject. After observing that the air enters not only into the lungs and about the parietes of the chest, but that it also penetrates by certain openings (foramina) into eight pneumatic bags or air-cells, occupying a considerable portion of the pectoro-abdominal cavity, and thence into the upper and lower extremities, he concludes, 1. That the pneumatic bags are so situated as to be ready conductors of the air into the more solid parts of the body; and that the air, by surrounding the most weighty viscera, may support the bird in flight, and contribute to the facility of its motions when so employed. 2. That the quantity of air thus introduced penetrates the most internal recesses of their bodies, tending to dry the marrow in the bones and a portion of the fluids, a diminution of specific gravity is the result, the true cause of which has been, in his opinion, vainly sought in the quantity alone of permeating air. 3. That in birds the oxidation of the nourishing juices is not entirely effected in the lungs, but is much promoted also in the pneumatic bags above-mentioned, for there contained air operates through the membranes upon the blood vessels and lymphatics in contact with them, a more complete and speedy oxidation is the result. 4. That not only the skeleton, but all the viscera are much more permeable by air in birds than in any of the other vertebrated animals. 5. That the air-reservoirs are not always symmetrical, their shape and extent depending entirely upon the form and situation of the organs among which they occur; but the supply is so modified that the total quantity received into the pneumatic bags on the right side of the body is equal to that which enters into those on the left, and indeed without the maintenance of this condition the act of flying would be impossible, and that of walking difficult. 6. That no portion of a bird's structure is impervious to air; it reaches even the last joints (phalanges) of the wings and feet, and the last caudal vertebræ, or rump-bones. The quill of the feathers is not excepted, as has been sometimes asserted. 7. That the air within the head has a separate circulation, and does not directly communicate with the air-pipes of the rest of the body. 8. That in no instance does the air come into direct contact with the viscera or nourishing juices, but invariably through the medium of a membrane, however fine and transparent. 9. That the volume of air which birds can thus introduce into their bodies, and the force with which they can expel it, offer the only explanation how so small a creature as a singing-bird (the nightingale, for example) is able to utter notes so powerful, and, without any apparent fatigue, to warble so long and so musically.

Fig. 1171 is a section of the head of the rhinoceros hornbill, showing the extensive development of the air cells.

Birds are either carnivorous, insectivorous, granivorous, or omnivorous, and their digestive apparatus is modified accordingly. The crop, which is a dilated sac at the termination of the gullet, leads by a canal into a second enlargement, the commencing portion of which is surrounded by a zone of glands pouring out a solvent or gastric fluid. This portion is termed ventriculus succenturiatus, and in granivorous and many other birds conducts to the gizzard, composed of two firm voluminous muscles, surrounding a cavity lined with a thick tough membrane. These muscles exert a sort of opposite, grinding motion, with pressure on each other like two mill stones, and the effect is a reduction of grain and other vegetable matter into a pulpy mass; but this cannot be done without a number of pebbles or coarse particles of sand are swallowed with the food (at least in granivorous birds), which by the working of the walls triturate the food among them. In mollusk feeding ducks the gizzard is enormously powerful, grinding down hard and sharp shells. In carnivorous birds there is no gizzard.

Birds are all oviparous, that is, they produce eggs which are hatched by incubation, and from which the young are excluded, in different degrees of development, those of the gallinaceous and duck tribes being the most matured; they are indeed capable of running about and picking food in the course of a few hours. Our pictorial museum contains an interesting series of eggs in different stages; but of these our notice must be very cursory.

Fig. 1172 represents the egg organ of the fowl; the eggs in this apparatus are found in all stages of maturity, from a minute yellow grain, upwards, to the size of a walnut; the largest are destined to be laid first; all are enveloped in a delicate membrane, but are destitute of the white, or albumen, and the shell; they exhibit the germ of the future bird, under a slightly elevated spot (see Fig. 1173). After becoming disengaged and passing into the egg-tube, they become covered with albumen, this with a double membrane, and lastly with a calcareous envelope. The albumen is laid on layer after layer in the egg-tube, and gradually coats the membrane enclosing the yolk, some of it being inspissated so as to form an almost invisible membrane, the chalaza, which, being twisted by the revolutions of the yolk, is gathered into delicate spiral cords, retaining the yolk in its place. This albumen and chalaza are secreted in the first part of the egg-tube; in the next part the investing membrane (membrana putaminis) is formed and added, and lastly the shell.

The anatomy of the egg, prior to the commencement of incubation, says Professor Jones, is sufficiently simple (see Fig. 1174). Immediately beneath the shell (permeable by air) is the membrana putaminis, consisting of two layers, separating at the larger end, so as to leave a space called the vesicula aëris, which is filled with air containing an unusual portion of oxygen, destined to serve for the respiration of the future chick. Enclosed in the membrana putaminis is the albumen with the suspending cords (chalaza), and lastly the yolk with its germ, enclosed in the membrana vitelli. It is by the natural warmth of the body of the parent, brooding over the eggs, that the vital, though as yet torpid, germ is called into activity, and begins to develop. Its progress is gradual, but rapid, till the chick breaks from its imprisonment, and commences a new career.

The changes which the chick undergoes in the egg during the process of incubation have engaged the attention of many philosophical naturalists, who have given the minute details of every phase; we shall not follow them, but refer to the series in our pictorial museum, as exhibiting the progress with sufficient clearness for those to whom minute anatomical disquisitions (scarcely allowable under our present plan) would not prove very attractive.

Fig. 1175, an egg as it appears twelve hours after incubation, with a magnified view of the germ in its first stage of development. Fig. 1176, an egg as it appears sixteen hours after incubation, with a magnified view of the embryo chick. Fig. 1177, the same, thirty-six hours after incubation. Fig. 1178, the same, with the chick and the first appearance of the principal blood-vessels magnified. Fig. 1179, an egg opened four days after incubation, with a magnified view of the chick. Here the pupil of the eye is distinctly visible, and in the head are five vesicles filled with a fluid; and these, as they enlarge, approach each other, coalesce, and form the brain invested with its membranes. Fig. 1180, the appearances of the fifth day; the lungs now begin to form. Fig. 1181, the egg and magnified chick six days after incubation. The spinal marrow, divided into two parts, is extended along the trunk. Fig. 1182, the appearances seven days after incubation. Fig. 1183, the development eight days after incubation. Fig. 1184, the same, nine days after incubation. Fig. 1185, the same egg turned more to its right side. The bones are now beginning to form. Fig. 1186, tenth day. The muscles of the wings and germs of the feathers appear. Fig. 1187 represents the chick at this stage removed from the egg. Fig. 1188, the fourteenth day. Fig. 1189 shows the external half of the vesicle removed. Fig. 1190, the chick removed. Fig. 1191, the eighteenth day. Fig. 1192, the same, with part of the vesicle removed, showing the chick more clearly. Fig. 1193, the chick opened to show the absorption of the yolk into the body. Fig. 1194, the condition of the chick on the twentieth day. Figs. 1195 and 1196, the position of the chick in the egg previous to liberation. Fig. 1197, eggs fractured by the included chicks in the act of liberating themselves. Fig. 1198, positions of the shell after the escape of the chick. Contrary to what some persons suppose, the chick frees itself from its narrow prison by its own exertions, and not by the aid of the mother, as some have supposed from the circumstance that pieces of the shell are often broken off, while the membrane within remains unruptured; but the fact is that the membrane is yielding and elastic, while the shell is not; the latter therefore breaks, while the membrane stretches. It might be supposed that this task was much above the strength of the yet feeble chick, did we not reflect that instinct calls upon it to exert its utmost energies, and that its very position favours its efforts. The bill is still soft, indeed, and might at first seem ill fitted for breaking the shell; but a provision is made; for, as Mr. Yarrel observes, "upon the curved part of the upper mandible just above the point, will be seen a small horny scale, nearly circular, having at its centre a hard and sharp projecting point, and, by the particular position of the head, this sharp point is brought into constant contact with the inner surface of the shell." Such, at least, is the use generally attributed to this horny point; and it is to be remarked that when the chick escapes, and the beak hardens by exposure to the air, it soon falls off, and on the second or third day only a light-coloured mark is observable on the spot it had occupied. In pigeons, and other birds which are long before they become capable of running about and feeding themselves, this horny point remains for more than a week. It is worthy of note that on the beak of the very young Ornithorhynchus a similar horny scale exists. Here, then, we leave our preliminary observations, and advance to our pictorial specimens of the feathered tribes.

ORDER RAPTORES.

Beak strong and hooked; flight soaring and rapid; talons sharp, incurved, and powerful. Appetite carnivorous. Digestive organs simple. Females in general larger than the males. Toes, three before and one behind.

Family FALCONIDÆ

(Eagles, Falcons, Hawks, Kites, Buzzards, Harriers, &c.).

1199, 1200.—The Golden Eagle.

(*Aquila chrysaetos*). We select the Golden Eagle as a specimen of the present family, not indeed because it is what modern naturalists call the type, which may be found in the Peregrine or the Iceland Falcon, but because it is associated in our minds with ideas of courage, strength, and ferocity, characteristics which are not displayed even by some of the species of the genus Falco, as the Kestrel for example, and still less so by the species of other genera.

What the feline and musteline races are among terrestrial quadrupeds, that are the Falconidæ among birds. They live by slaughter; their life is passed "in arms," and they carry on with unceasing activity the work of destruction: they rejoice in carnage, and cower with outspread wings over their reeking quarry, uttering shrieks of exultation.

Their bearing is lofty and noble; their eyes are large, bright, and piercing; their frame sinewy and muscular; their flight impetuous. Their beak is strong and hooked, and the talons are formidable. Look at those of the Golden Eagle (Fig. 1201), and picture them driven with remorseless force into the flesh of the agonizing victim.

The Falconidæ live either alone or in pairs: some tenant deep forests, others scour wide and level plains or high moorland; some haunt the sea-shore and build on the wave-beaten rocks, and some make the "difficult peak" of the mountain-range their home. They surround their eyry with the relics of many a sanguinary feast, and their "young ones suck up blood."

Among the Falconidæ the eagles are pre-eminent in size and daring. When at rest on the crag of the rock, they assume an attitude of dignified calmness, as if conscious of superiority; but the bright glance of the eye betrays the ferocity of disposition which the next moment may be displayed in a terrific burst, as, sweeping down with irresistible force, they prostrate their victim, and dye their beak and talons in its gore.

In all the eagles the cere at the base of the beak is large and perforated by the nostrils; the talons are strong, the wings ample and slightly rounded, the fourth quill-feather being the largest. In the genus Aquila, which includes the golden eagle, the tarsi are plumed to the toes; the beak is subtriangular above; the nostrils are rounded.

The golden eagle (Eryr Melyn of the ancient British) was once common in many parts of England, and, till in comparatively recent times, bred annually in Cumberland, Westmoreland, and the Peak of Derbyshire. It is still to be seen in the Highlands of Scotland, and in some districts of Ireland is far from being uncommon. Mr. Thompson ('Mag. of Zool. and Botany,' vol. ii. p. 43) states that the gamekeeper of Mr. Stewart, between the years 1828 and 1832, had killed thirteen or fourteen golden eagles on the mountain-range of the Horn (the name given to the peninsula bounding the western entrance to Sheephaven, in the county of Donegal, and which terminates in the stupendous promontory of Horn Head); and the same observant naturalist writes—"On visiting Achil, off the coast of Mayo, in June, 1834, in company with Robert Ball, Esq., of Dublin, Lieutenant Reynolds of the Preventive Service, a keen sportsman, and well acquainted with birds, assured us that one or two pairs of golden eagles breed annually in the island. When subsequently on the mountain of Croagh-patrick, which terminates volcano-like in a magnificent cone, and is in elevation the second in Connaught, we for a considerable time observed a pair of these eagles towering above its summit. In the county of Kerry, a few weeks afterwards, an eagle, supposed to be of this species, was seen by some of our party when viewing the Lakes of Killarney, from the topmost ridge of Mangerton. When on a visit to this same place the previous autumn, my friend Robert Patterson, Esq., of Belfast, made the following note, which he has kindly permitted me to use:—'Near to the little lake called the Devil's Punchbowl, we disturbed four eagles, preying on a full-grown sheep: they rose majestically into the air as we approached. The people who were with us supposed the sheep, being perhaps sickly, had been killed by the eagles, a supposition corroborated by the quantity of fleece scattered over the ground for some yards in one direction. The flesh of the neck was completely removed, although that of every other part was untouched. We were assured that two eagles will occasionally pursue a hare, one flying low, coursing it along the ground, the other keeping perpendicularly above the terrified animal. When the lowest eagle tires, they change places, and pursue the same system of tactics, until the hare is completely wearied out. I was told the same circumstance a few days afterwards near Tralee, and again near Monasterevan: my informant in every instance stated the fact as having fallen under his own knowledge, and not as a matter of hearsay.'"

The mode of pursuing the hare above described, and on the correctness of which we rely, reminds us that either this or an allied eagle (Aquila imperialis) is employed by the Tartars in the chase of antelopes, wolves, foxes, hares, &c.; nor would it appear that there is much difficulty in training these powerful birds to the work; for though eagles captured when adult are extremely savage and indocile, they are as easily reclaimed as the Peregrine Falcon when taken young from the nest. Mr. Thompson observes that R. Langtry, Esq., of Fortwilliam, near Belfast, "has at present an eagle of this species which is extremely docile and tractable. It was taken last summer from a nest in Inverness-shire, and came into his possession about the end of September. This bird became at once attached to its owner, who, after having it about a month, ventured to give it its liberty, a privilege which was not on the eagle's part abused, as it came to the lure whenever called. It not only permits itself to be handled any way, but seems to derive pleasure from the application of the hand to its legs and plumage. The eagle was hooded after the manner of the hunting hawks for some time, but the practice was abandoned; and although it may be requisite if the bird be trained for the chase, hooding is otherwise unnecessary, as it remains quiet and contented for any length of time, and no matter how far carried on its master's arm. It is quite indifferent to the presence of any persons who may be in his company, and is unwilling to leave him even to take a flight, having to be thrown into the air whenever he wishes it to do so. When this eagle is at large he has only to hold out his arm towards it, which, as soon as perceived, even at a distance, it flies to and perches on. I have seen it thus come to him not less than a dozen times within half an hour without any food being offered. It runs very fast, and when on the ground and the lure is thrown comparatively near, it prefers this mode of progression to using its wings. Live rats have several times been turned out of the cage-trap to this bird, but before running very far were invariably pounced upon." Other instances of the docility of the golden eagle might be adduced.

Of the boldness or rather familiarity of this species the following statement from the writer already quoted is a proof:—"A sporting friend," he says, "who was an eye-witness to the fact, assures me that when out hunting among the Belfast mountains many years ago, an eagle, which, from the darkness of its plumage, he considered to be the golden, appeared above his hounds as they came to a fault on the ascent to Divis (the highest of the chain) after a good chase. As they came on the scent again, and were at full cry, the eagle for a short time kept above them, but at length advanced, and carried off the hare when at the distance of from three to four hundred paces before the hounds."

Fig. 1200 is a spirited delineation of an eagle brooding over her callow young, which are well supplied with game. Instances, indeed, are on record (as that of a peasant in Kerry, and of a man at Glenarm in Antrim) of persons supporting their family for a considerable length of time on the produce of the industry of the parent birds, which continue to bring food to their young, making up for the recurring abstraction. Young lambs, hares, rabbits, and grouse form the chief articles of provision. Low, in his 'Fauna Orcadensis,' says that they do not abstain from pork in the Orkneys, but occasionally seize both old and young swine. A clergyman told him that he had seen one, mounted in the air, with a pretty large pig in her talons, which she let fall alive when he fired at her. Martin, in his 'Description of the Western Islands of Scotland,' published in 1716, speaking of this bird, says,—"The eagles are very destructive to the fawns and lambs. The natives observe that it fixes its talons between the deer's horns, and beats its wings constantly about its eyes, which puts the deer to run continually till it falls into a ditch or over a precipice, where it dies, and so becomes a prey to this cunning hunter. The eagle never engages in a perfectly solitary chase except when the female is confined to her eggs or her young. At that season the proper prey of these eagles is generally so abundant that the male is able to provide for his own wants and those of the family without the assistance of the female. At other times they unite their exertions, and are always seen either together or only at a short distance from each other. It is said that the one beats the bushes, while the other, perched on an eminence, watches the escape of the prey."

Pennant adds his authority to part of Martin's statement, and says that the eagles in the island of Rum have nearly extirpated the deer that used to abound there. He also states that eagles seem to give a preference to the carcases of cats and dogs. "Persons who make it their business to kill these birds lay that of one or other by way of bait, and then conceal themselves within gun-shot. They fire the instant the eagle alights, for she that moment looks about before she begins to prey."

Martin, in the work just quoted, relates the following anecdote, and one very similar is also related by Sir Robert Sibbald:—"There is a couple of large eagles who have their nest on the north end of the isle [St. Kilda]. The inhabitants told me that they commonly make their purchase in the adjacent isles and continent, and never take so much as a lamb or hen from the place of their abode, where they breed. I forgot to mention a singular providence that happened to a native of the Isle of Skye, called Neil, who, when an infant, was left by his mother in the field not far from the houses on the north side of Loch Portrie; an eagle came in the mean time and carried him away in its talons as far as the south side of the loch, and there laid him on the ground. Some people that were herding sheep there perceived it, and, hearing the infant cry, ran immediately to its rescue, and, by good providence, found him untouched by the eagle, and carried him home to his mother. He is still living in that parish, and by reason of this accident is distinguished among his neighbours by the surname of Eagle." Ray mentions an instance of a child a year old being seized by an eagle in one of the Orkneys, and carried to the eyry about four miles distant. But the mother, who was aware of its situation, pursued the bird thither, found her child in the nest, and took it home unhurt. Other instances are related, but we confess we regard them with suspicion. (See Fig. 1206.)

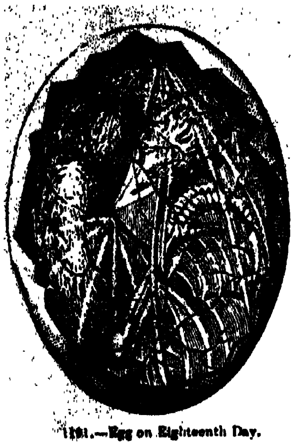
Fig. 1202, an eagle among the wild mountains of G[illegible].

Elevated on some lofty pinnacle (Fig. 1203), or soaring in the sky, "towering in his pride of place," the eagle gazes below and around, and marks his prey at an astonishing distance. His wonderful powers of vision have supplied the poets with apt similes, as have also his power and ferocity. Homer, speaking of Menelaus, describes him as

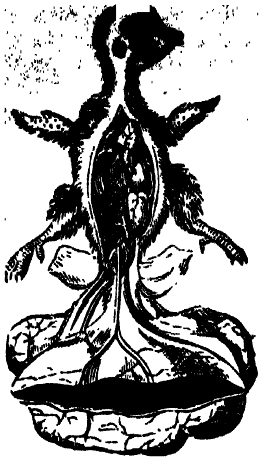
> [illegible]

The eye of the eagle is indeed large, compared with the skull; though the mere bulk of the eye is a fallacious test, and as in the whip-poor-will, owl, &c., is often connected with no turn for crepuscular vision. Fig. 1204 represents a preparation of the skull and eyes of the Golden Eagle; and Fig. 1205 represents *a*, the convexity of the orbit of the eye, *b*, the crystalline lens of the same bird; *a*, the anterior surface somewhat less convex than the posterior one.

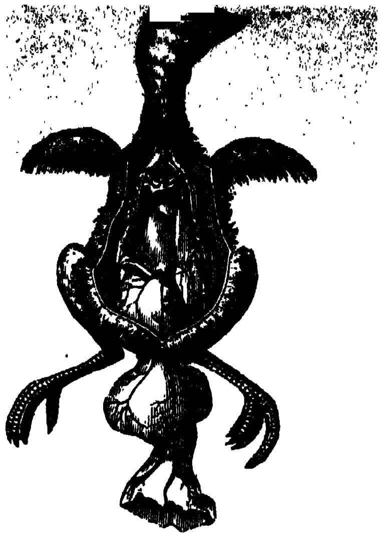
The golden eagle is common in many parts of the Continent, where, in level districts, it frequents extensive forests. It is found in France, in the forest of Fontainebleau, as well as on the mountains of Auvergne and the Pyrenees; it is abundant in Tyrol, Russia, Sweden, Franconia, and Suabia, but is rare in Holland. Of the havoc it occasions where common some idea may be formed from the statement of Bechstein, that in one eyry in Germany the skeletons of three hundred ducks and forty hares were found; and these were, in all probability, the relics of such prey only as it could carry to its nest, the remains of the larger game, sheep, fawns, roebucks, &c., being left after the feast on the spot where the animals were slaughtered. The present species is found in various parts of Asia. We have seen specimens from India, and Colonel Sykes enumerates it among the birds of the Dukhun. Nor is it to the Old World that this eagle is confined. It inhabits North America, from the temperate to the Arctic regions, where, according to Wilson, it is sparingly dispersed, breeding on high precipitous rocks, and always preferring a mountainous country. Dr. Richardson, in his 'Fauna Boreali-Americana,' mentions it with a query as breeding in the recesses of the subalpine country which skirts the Rocky Mountains, and as seldom seen farther to the eastward. It is the Kœoo of the Cree Indians. This eagle "is held by the aborigines of America, as it is by almost every other people, to be an emblem of might and courage; and the young Indian warrior glories in his eagle-plume as the most honourable ornament with which he can adorn himself. Its feathers are attached to the calumets, or smoking-pipes, used by the Indians in the celebration of their solemn festivals, which has



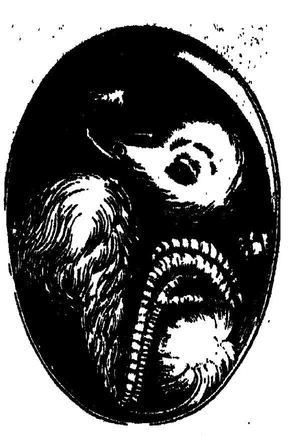
1191.—Egg on Eighteenth Day.



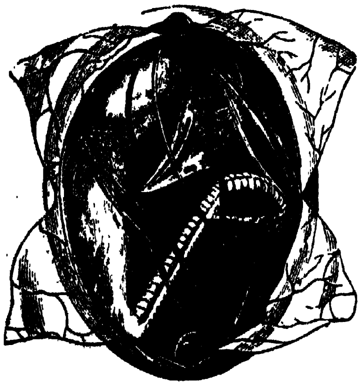
1190.—Chick at Fourteen Days.



1193.—Chick, showing absorption of yolk.

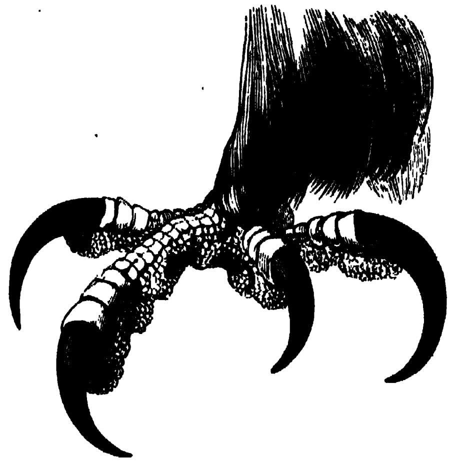


1194.—Chick on Twentieth Day.

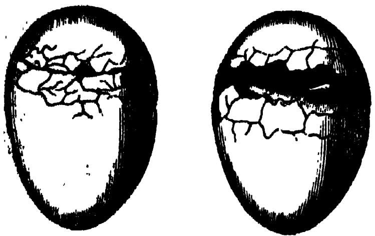


teenth Day, with vesicl partly removed.

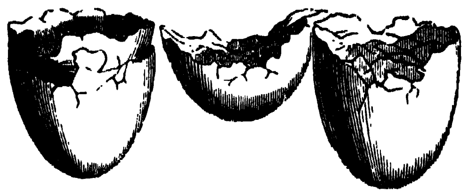
1199.—Golden Eagle.



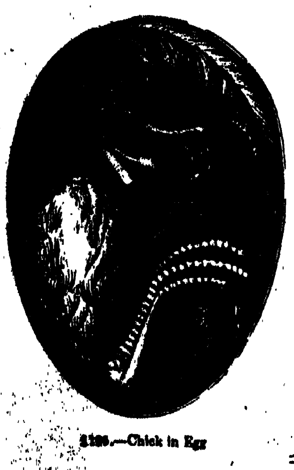
1201.—Talons of Golden Eagle.



.—Egg fractured by Chick in act of liberating itself.

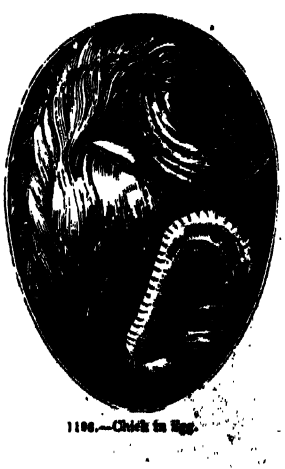


1198.—Position of Shells after Escape of Chick.



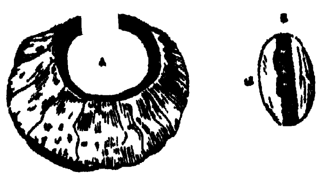
1196.—Chick in Egg

1200.—Golden Eagle.

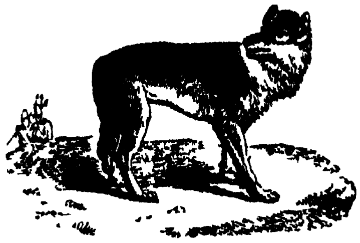


1195.—Chick in Egg.

1202.—Golden Eagle

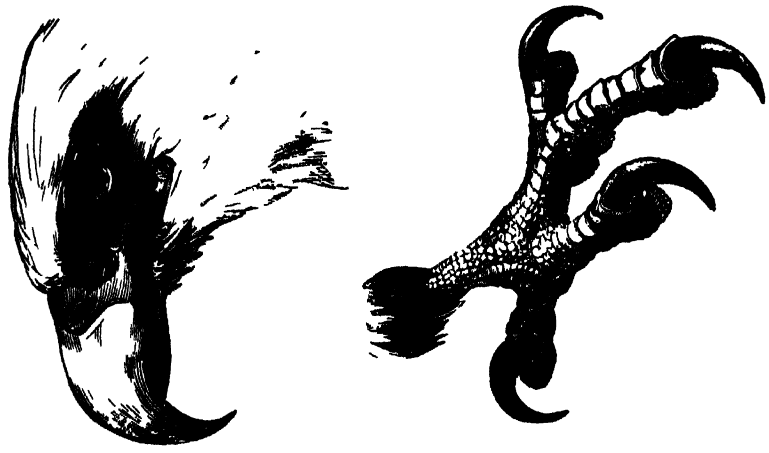


1205.—Parts of Eye of Eagle



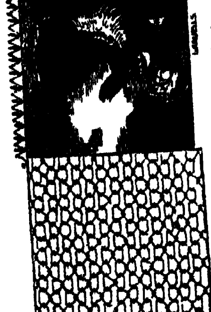
1207.—Eagle flown at Wolf

1208.—Imperial Eagle



1210.—Head and Foot of White-headed Eagle

1204.—Skull of Eagle



1206.—Eagle and Child.

1209.—Eagle of [illegible]

obtained for it the name of the Calumet Eagle. Indeed so highly are these ornaments prized, that a warrior will often exchange a valuable horse for the tail-feathers of a single eagle.

The age attained by the eagle is very great: one that died at Vienna is said to have lived in confinement one hundred and four years.

As is the case with all the Falconidæ, the young and old birds differ in the colour and markings of the plumage, a circumstance which, before it was clearly understood, led to the erroneous multiplication of species, as the works of the older naturalists abundantly testify.

The old birds have the top of the head and back of the neck covered with slender-pointed feathers of a bright golden red: all the other parts of the body are obscure brown, more or less blackish according to the age of the individual; inside of the thighs and feathers of the tarsus clear brown; no white feathers among the scapulars; tail deep grey, regularly barred with blackish brown, and terminated at the end by a large band of that colour; beak horn-colour; iris brown; cere and feet yellow. In this state M. Temminck considers it to be the Aquila fulva of Meyer; Falco niger, Gmelin; Falco fulvus and F. Canadensis, Gmelin; Falco chrysaetos, Linnæus; Aigle royal, Buffon; Grand Aigle, Gerard.

Length about three feet; expanse of wings about eight feet. Female three feet and a half in length; expanse of wing nine feet.

Young birds of one or two years old, the Ring-tail Eagle of various writers, have all the plumage of a ferruginous or clear reddish brown, uniform on all parts of the body. Lower tail-coverts whitish; inside of the thighs and feathers of the tarsus white; tail white from the base to three-fourths of its length, but afterwards brown to the end. In the third year the adult plumage is assumed. The females, as in all the Falconidæ, exceed the males in size, contrary to the general law.

The nest of the golden eagle is composed of sticks, twigs, rushes, heath, &c., and is generally placed upon the jutting ledge of some inaccessible precipice: here it rears its young, generally two, sometimes three, in number, feeding them with bleeding morsels of the yet warm victim. In forests the nest is placed near the summit of a lofty tree.

Fig. 1207 represents an eagle flown at a wolf.

1208.—The Imperial Eagle

(*Aquila imperialis*, Temminck); Aquila heliaca, Vieillot. This species is closely allied to the golden eagle, but has longer wings and large white scapulary feathers. It is extremely powerful, fierce, and destructive. The imperial eagle inhabits the mountain districts of the south of Europe and the adjacent countries of Asia, but is never seen in the British Islands.

1209.—The White-Headed Eagle

(*Haliæetus leucocephalus*); Bald Eagle, Latham and Wilson; Falco ossifragus (young), Wilson The characters of the genus Haliæetus may be summed up as follows:—Bill elongated, strong, straight at the base, curving in a regular arc in advance of the cere to the tip, and forming a deep hook; nostrils transverse, large, lunate. Wings ample; the fourth quill-feather the longest. Legs having the tarsi half-feathered, the front of the naked part scutellated, and the sides and back reticulated. Toes divided to their origin; the outer one versatile. Claws hooked and strong, grooved beneath; claw of hind-toe the largest, and next that of the inner toe. See Fig. 1210, the Head and Foot of the White-headed Eagle.

Of the present genus several species, generally called Fishing or Sea Eagles, are known, as the Chilian Sea-Eagle (H. aguia), the Cape Fishing-Eagle of South Africa (H. vocifer), the Sea-Eagle, Erne, White-tailed Eagle, or Cinereous Eagle (H. albicilla, Selby) of Europe and the British Isles, and the White-headed Eagle of America. It is the latter that will more particularly engage our present attention.

This species (like its British representative) varies greatly in its plumage at different stages of life: hence the Cree Indians, who term the species Meekeeshew, add other epithets by way of distinction. The mature bird is called Wapustiquan-Meekeeshew, or White-headed Eagle; the immature bird, Appisk-Meekeeshew, or Black-headed Eagle; and the yearling bird, Meekeeseeseesh.

This noble bird, emblazoned on the national standard of the United States of America (not much to the satisfaction of Benjamin Franklin), is spread throughout nearly the whole of the northern division of the New World, and is common along the course of the larger rivers, and at their embouchures, as well as along the coast of inland lakes and of the sea.

"The celebrated cataract of Niagara," says Wilson, "is a noted place of resort for the bald eagle, as well on account of the fish procured there, as for the numerous carcasses of squirrels, deer, bears, and various other animals, that, in their attempts to cross the river above the falls, have been dragged into the current, and precipitated down that tremendous gulf, where, among the rocks that bound the rapids below, they furnish a rich repast for the vulture, the raven, and the subject of the present account." "Formed by nature for braving the severest cold; feeding equally on the produce of the sea and of the land; possessing powers of flight capable of outstripping even the tempests themselves; unawed by anything but man; and from the ethereal heights to which he soars, looking abroad at one glance over an immeasurable expanse of forests, fields, lakes, and ocean deep below him, he appears indifferent to the change of seasons, as in a few minutes he can pass from summer to winter, from the lower to the higher regions of the atmosphere, the abode of eternal cold, and thence descend at will to the torrid or to the arctic regions of the earth: he is therefore found at all seasons in the countries he inhabits, but prefers such places as have been mentioned above, from the great partiality he has for fish." "In procuring these, he displays, in a very singular manner, the genius and energy of his character, which is fierce, contemplative, daring, and tyrannical; attributes not exerted but on particular occasions, but, when put forth, overpowering all opposition. Elevated on the high, dead limb of some gigantic tree that commands a wide view of the neighbouring shore and ocean, he seems calmly to contemplate the motions of the various feathered tribes that pursue their busy avocations below—the snow-white gulls slowly winnowing the air, the busy tringæ coursing along the sands, silent and watchful cranes intent and wading, clamorous crows, and all the winged multitudes that subsist by the bounty of this vast magazine of nature. High over all these hovers one whose action instantly arrests his whole attention. By his wide curvature of wing and sudden suspension in air, he knows him to be the fish-hawk, settling over some devoted victim of the deep. His eye kindles at the sight, and, balancing himself with half-opened wings on the branch, he awaits the result. Down, rapid as an arrow, from heaven descends the distant object of his attention, the roar of its wings reaching the ear as it disappears in the deep, making the surges foam around. At this moment the eager looks of the eagle are all ardour; and, levelling his neck for flight, he sees the fish-hawk once more emerge struggling with his prey, and mounting in the air with screams of exultation. These are the signal for the eagle, who, launching into the air, instantly gives chase, and soon gains on the fish hawk. Each exerts his utmost to mount above the other, displaying in these rencontres the most elegant and sublime aërial evolutions. The unencumbered eagle rapidly advances, and is just on the point of reaching his opponent, when, with a sudden scream, probably of despair and honest execration, the latter drops his fish; the eagle, poising himself for a moment, as if to take a more certain aim, descends like a whirlwind, snatches it in his grasp ere it reaches the water, and bears his ill-gotten booty silently away to the woods." It is this eloquent descriptive passage which the representation, Fig. 1209, is intended to illustrate.

This is not the only mode in which the white-headed eagle procures his sustenance. Young lambs and pigs, ducks, geese, swans, and various sea-fowl, are attacked and carried away. Mr. J. Gardiner stated to Wilson that he had seen one flying with a lamb ten days old, but which, from the violence of its struggles, it was obliged to drop, at the height of a few feet from the ground. He adds that, by running up and hallooing, he prevented it from again seizing the lamb, whose back it had broken, and to whose misery he put an instant termination. The dam seemed astonished to see its offspring suddenly snatched up, and borne off by a bird. Sheep, if old or sickly, are also subject to the attacks of these tyrants of the feathered race; nor do they reject carrion, keeping the vultures (over which they often exercise their despotism) at a respectful distance, waiting till they have gorged their fill and departed. Now and then they procure fish for themselves in shallow places, wading in the water, and striking at them with their beak. They have been known even to attack children. We have quoted Wilson's animated description of the attack of the white-headed eagle upon the fish-hawk or osprey; and, in justice to Mr. Audubon, we will transcribe his equally graphic details of a different conflict:—"To give you," he writes, "some idea of the nature of this bird, permit me to place you on the Mississippi, on which you may float gently along, while approaching winter brings millions of water-fowl, on whistling wings, from the countries of the north, to seek a milder climate in which to sojourn for a season. The eagle is seen perched, in an erect attitude, on the summit of the tallest tree by the margin of the broad stream. His glistening but stern eye looks over the vast expanse; he listens attentively to every sound that comes to his quick ear from afar, glancing every now and then on the earth beneath, lest even the light tread of the fawn may pass unheard. His mate is perched on the opposite side, and, should all be tranquil and silent, warns him, by a cry, to continue patient. At this well-known call he partly opens his broad wings, inclines his body a little downwards, and answers to her voice in tones not unlike the laugh of a maniac. The next moment he resumes his erect attitude, and again all around is silent. Ducks of many species—the teal, the widgeon, the mallard, and others—are seen passing with great rapidity, and following the course of the current, but the eagle heeds them not: they are at that time beneath his attention. The next moment, however, the wild trumpet-like sound of a yet distant but approaching swan is heard. A shriek from the female eagle comes across the stream, for she is fully as alert as her mate. The latter suddenly shakes the whole of his body, and, with a few touches of his bill, aided by the action of his cuticular muscles, arranges his plumes in an instant. The snow-white bird is now in sight; her long neck is stretched forward; her eye is on the watch, vigilant as that of her enemy; her large wings seem with difficulty to support the weight of her body, although they flap incessantly: so irksome do her exertions seem, that her very legs are spread beneath her tail to aid her in her flight. She approaches however. The eagle has marked her for his prey. As the swan is passing the dreaded pair, starts from his perch the male bird in preparation for the chase, with an awful scream, that to the swan's ear brings more terror than the report of the large duck-gun. Now is the moment to witness the display of the eagle's powers. He glides through the air like a falling star, and, like a flash of lightning, comes upon the timorous quarry, which now, in agony and despair, seeks by various manœuvres to elude the grasp of his cruel talons. It mounts, doubles, and willingly would plunge into the stream were it not prevented by the eagle, which, possessed of the knowledge that by such a stratagem the swan might escape him, forces it to remain in the air by attempting to strike it with his talons from beneath. The hope of escape is soon given up by the swan. It has already become much weakened, and its strength fails at the sight of the courage and swiftness of its antagonist. Its last gasp is about to escape, when the ferocious eagle strikes with its talons the under side of its wing, and, with unresisted power, forces the bird to fall in a slanting direction upon the nearest shore. It is then that you may see the cruel spirit of this dreaded enemy of the feathered race, whilst, exulting over his prey, he, for the first time, breathes at ease. He presses down his powerful feet, and drives his sharp claws deep into the heart of the dying swan; he shrieks with delight as he feels the last convulsions of his prey, which has now sunk under his efforts to render death as painful as it possibly can be. The female has watched every movement of her mate; and if she did not assist him in capturing the swan, it was not from want of will, but merely that she felt full assurance that the power and courage of her lord were quite sufficient for the deed. She now sails to the spot where he eagerly awaits her; and when she has arrived, they together turn the breast of the luckless swan upwards, and gorge themselves with gore."

The white-headed eagle is seldom seen alone, but generally in company with its mate; the union continues during life; they hunt for the support of each other, and feed together. The nest is usually placed on some tall tree, with a massive towering stem destitute of branches for a considerable height. It is composed of sticks, clods, weeds, and moss, and measures five or six feet in diameter; and being annually augmented by fresh layers (for it is used year after year), it is often as much in depth. The eggs are from two to four in number, and of a dull white. The attachment of the parents to their young is very great; and they provide abundantly for their support, bringing home fish, squirrels, young lambs, opossums, racoons, &c. Incubation commences in January.

This eagle requires at least four years before it attains the full beauty of its plumage, and acquires the white head and neck; but it breeds the first spring after birth. Colour of adult:—general plumage of a deep chocolate, approaching black; head, neck, tail, and upper tail-coverts white.

1211, 1212.—The Osprey, Fish-hawk, or Bald Buzzard

(*Pandion Haliaetus*, Savigny); Le Balbusard, Buffon. The generic characters of the genus Pandion are these:—beak rounded above; cere hispid; nostrils lunulated; tarsi naked, and cov anteriorly with rigid reticulated scales. Toes outermost versatile. Claws large, much curved, equal, and rounded underneath; under surface of toes very rough with sharp pointed scales. Wings long and ample, second and third quill-feathers the longest. See Fig 1213, the Head and Foot of the Osprey.

The osprey is widely spread, being dispersed over Europe and a great part of Asia, as well as North America, but is everywhere a bird of passage Being strictly piscivorous, it is only in the vicinity of lakes and rivers and along the coast that it is ordinarily met with. In England, according to Montagu, this bird is more abundant in Devonshire than in any other district In Ireland it occasionally visits the lakes of Killarney. In Scotland it appears to be more common Mr Selby observed several upon Loch Lomond, where they are said to breed, and upon Loch Awe, where an eyrie is annually established upon the ruins of a castle near the southern extremity of the lake, and another in a similar situation nearly opposite to the gorge or egress of the River Awe On the Continent this bird annually visits the larger rivers and lakes of Russia, Germany, and the middle districts of Europe, whence it passes southwards on the approach of winter. In its habits it appears to be partially gregarious, several pairs associating together, and in harmony pursuing their occupation In America the fish-hawk, according to Wilson, arrives on the coasts of New York and New Jersey about the 21st of March, and retires to the south about the 22nd of September. "On the arrival of these birds in the northern parts of the United States in March, they sometimes find the bays and ponds frozen, and experience a difficulty in procuring fish for many days, yet there is no instance on record of their attacking birds or inferior land-animals with intent to feed on them, though their great strength of flight, as well as of feet and claws, would seem to render this no difficult matter To the white-headed eagle the arrival of these fish hawks brings promise of gain, we have shown the tyrannical conduct of the former, sometimes however, a number of the fish hawks make common cause against their oppressors and succeed in driving them from the scene of action "The first appearance of the fish hawk in spring is welcomed by the fishermen as the happy signal of the approach of those vast shoals of herring shad, &c that regularly arrive on the coast, and enter the rivers in prodigious multitudes Two of a trade, it is said seldom agree the adage, however, will not hold good in the present case, for such is the respect paid to the fish-hawk, not only by this class of men, but generally by the whole neighbourhood where it resides, that a person who should attempt to shoot one of them would stand a fair chance of being insulted This prepossession in favour of the fish hawk is honourable to their feelings They associate with its first appearance ideas of plenty and all the gaiety of business, they see it active and industrious, like themselves, inoffensive to the productions of their farms building with confidence, and without the least disposition to concealment, in the middle of their fields and along their fences, and returning year after year regularly to its former abode"

The flight of this bird is easy and graceful, and its plunge, when sweeping down to its finny prey, inconceivably rapid Audubon says that it never strikes at a fish leaping out of the water In the Gulf of Mexico, where these birds are numerous and where shoals of flying fish are continually emerging from the sea to escape the pursuit of the dolphins, he observed that the fish-hawks never made a sweep at them, but would at once plunge after them, or other fish, while swimming in their usual mode near the surface When it plunges into the water in pursuit of a fish, it sometimes proceeds deep enough to disappear for an instant, throwing the water around into foam on rising, it mounts a few yards into the air, shakes off the spray, and flies off to its nest with its booty, or to an accustomed tree, there to satisfy its appetite, when, without longer repose, it again launches into the air, and sails, circling at a great height over the waters.

The nest of the fish-hawk is built on a tree, and consists of a mass of sticks, seaweed, grass, turf, &c, and being repaired every year, is sometimes a fair cartload. Among the interstices of the materials other birds are permitted to nidify, and several pairs of grakles, or crow blackbirds, may be often seen taking up their abode around the margin and sides of the structure, "like humble vassals round the castle of their chief," laying their eggs, rearing their young, and living together in the utmost harmony.

The fish-hawk breeds in May; and both parents are devoted to their young, defending them from any assailant with indomitable resolution, and using both beak and talons with terrible effect. The young are generally three in number. The eggs are yellowish white irregularly spotted with yellowish brown.

The fish-hawk is about two feet in length, and about five feet three or four inches in expanse of wing. The plumage is very compact and imbricated; bill brownish black, blue at the base, cere light blue, iris yellow. Feet pale greyish blue, claws black General colour of the upper parts dusky brown, tale barred with pale brown, upper part of head and neck white, with a brown mark on the crown, and a brown stripe from the bill down each side of the neck Under parts of the neck brownish white streaked with dark brown Under parts generally white

1214 —THE BARRED HÆMATORNIS

(*Hæmatornis undulatus*) The genus Hæmatornis which contains several species, was first characterized by Mr Vigors Beak rather strong, moderately elongated upper mandible straight at the base, very much curved at the apex, nostrils oval and oblique Wings long, and rather rounded Feet weak for an eagle, tarsi rough, reticulated with scales, toes rather short, claws strong, tail moderate and rounded

To this genus belongs the Bacha Eagle of South Africa (H Bacha), the Manilla Hæmatornis (H holospilus), and the Barred Hæmatornis (H undulatus), a native of the Himalayan Mountains

The description of the latter is as follows — Back and wings intense brown, head crested with feathers white at the base, black at the point Wing-coverts marked with small white spots, quill feathers marked with white towards the base of the inner web Under parts brownish red, breast with wavy bands of brown, abdomen with white spots margined with a ring of brown Cere, base of beak, and legs yellow, claws black Length about two feet seven inches (male), female a third larger

Of the habits of this species little is known probably they resemble those of the African species which preys habitually on the Daman or Cape Hyrax, watching for its victims, as they emerge from their retreats, and instantly darting upon them

1215, 1216 —THE HARPY EAGLE

(*Harpyia destructor*) The Harpy Eagle constitutes the type of a distinct section among the birds of prey, a section first established by Cuvier, and adopted by most naturalists The species comprehended in this genus, Harpyia, are exclusively American they are characterized by the enormous thickness and strength of the tarsi, which are feathered halfway down, the wings are short and rounded, the beak is strongly hooked, as are the talons also, and of formidable magnitude Comparing the harpy with the golden eagle, we observe the former to be distinguished not only by shorter, but by more rounded wings, by tarsi far more robust, and only partially feathered, by more powerful talons, and by a more stout and curved beak the physiognomy of the two birds is also very different, both have a stern, but glistening eye, indicative of courage and ferocity, of both the port is royal, but the arrangement of the feathers of the head in the harpy in some degree reminds us of the great-eared owl In the golden eagle the head and neck are covered with long narrow pointed feathers, which fall over each other, and yet preserve their distinctness of appearance On the contrary, the feathers of the neck and sides of the head in the harpy eagle are broad and rounded at their anterior margin, and capable of being puffed up, while on the back of the head, the feathers still of the same character, but longer, form a crest, which the bird can raise or depress at pleasure The middle feathers of this crest are shorter than the more lateral, so that when erected it is lowest in the centre, and rises at each side somewhat in the form of ears or tufts, but the proud deportment and the fierce glance of the eyes redeem the owl like character thus given to the head Often have we watched the splendid harpy eagle in the gardens of the Zoological Society, as he has sat upright on his perch, and motionless as a statue, unmoved by every attempt to intimidate him, or disturb his dignified composure, while the gleam of his eye fixed steadily upon us betokened at once daring and energy In strength none can equal him, in courage and ferocity none excel him But we have seen the harpy eagle under other circumstances: we have seen him feasting on his slaughtered prey, with his talons buried in the body, and his beak crimson with gore, on our approach, instead of quitting it, he has expanded his ample wings over it, so as to conceal it, and assumed a menacing attitude, as if prepared to contest the possession of it to the utmost, and such was the ferocity and power displayed, as to convince us that any attempt at interference (had it been practicable) would have been a most dangerous undertaking. The harpy eagle is a native of Guiana and other parts of South America, where it frequents the deep recesses of the forests remote from the abodes of man. Of its habits, however, in a state of nature, we have but little information. It is feared for its great strength and fierceness, and is reported not to hesitate in attacking individuals of the human race; nay, that instances have been known in which persons have fallen a sacrifice, their skulls having been fractured by the blows of its beak and talons This may be an exaggeration, but certainly it would be a hazardous experiment to venture unarmed near the nest of a pair of these formidable eagles. Hernandez states that this species not only thus ventures to assault man, but even beasts of prey According to Mandruyt, it makes great destruction amongst the sloths, which tenant the branches of the forest, and are ill fitted to resist so formidable an antagonist, it also destroys fawns, cavies, opossums, and other quadrupeds, which it carries to its lonely retreat, there in solitude to satiate its appetite. Monkeys are also to be numbered among its victims, but the sloth is said to constitute its ordinary prey Of its nidification we know nothing, as the eagles, however, lay only from two to three eggs, it is reasonable to suppose that the present species is not an exception to the rule

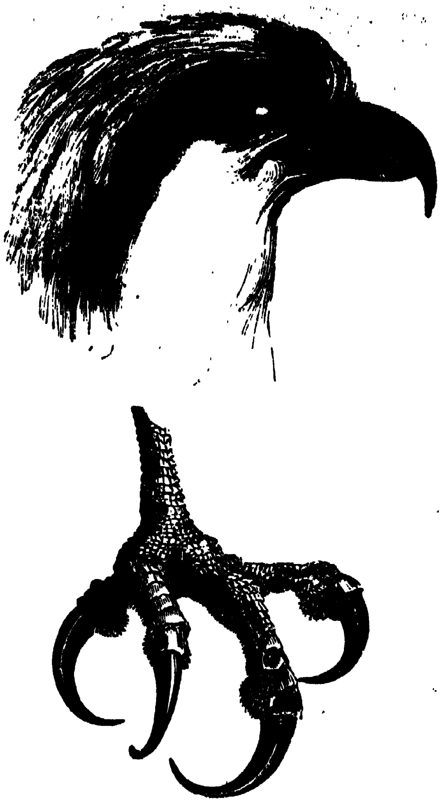
It has been correctly observed by Mr Selby, that the members of the Aquiline division of the Raptorial order do not possess the same facility of pursuing their prey upon the wing which we see in the falcons and hawks, for though their flight is very powerful, they are not capable of the rapid evolutions that attend the aerial attacks of the above-named groups, in consequence of which their prey is mostly pounced upon on the ground The shortness of the wings of the harpy eagle, when compared with those of the golden eagle of Europe, and their rounded form and breadth, though well adapting them for a continued, steady flight, render them less efficient as organs of rapid and sudden aerial evolutions than those of the latter, but as it inhabits the woods, and does not prey upon birds, but upon animals, incapable of saving themselves by flight, its powers of wing (or rather the modification of those powers) are in accordance with the circumstances as to food and locality under which it is placed If the harpy eagle soars not aloft, hovering over plains and mountains, it threads the woods it skims amidst the trees, and marks the sloth suspended on the branch, or the monkey dozing in unsuspicious security, and with unerring aim strikes its defenceless victims Mr Selby, commenting on the fierceness of a pair of golden eagles in his possession, and their readiness to attack every one indiscriminately, observes that when living prey (as hares, rabbits, or cats) are thrown to them, the animal is "instantly pounced on by a stroke behind the head, and another about the region of the heart, the bill appearing never to be used but for the purpose of tearing up the prey when dead" It is precisely in this manner that the harpy eagle deals with its victims, death seems the work of an instant, the strongest cat, powerless in his grasp, is clutched, and expires Nor will this surprise any one who has contemplated the power seated in the talons of this bird strong as are the talons of the golden eagle, great as is the muscular development of its limbs, and formidable as are its claws, they seem almost trifling compared with those of the harpy eagle In the museum of the Zoological Society are skeletons of both these birds, which it is interesting to compare together The thickness of the bones of the limbs in the latter, and especially of the tarsus which is *more* than double that of the golden eagle and the enormous size of the talons, are sufficient to convince the observer of the ease with which, when living the fierce bird would bury its sharp hooked claws in the vitals of its prey, and how vain resistance when the fatal grasp was taken In its native regions the harpy eagle is said to be by no means common, were it so, the destruction occasioned by its presence would, it might be naturally expected, preponderate over the renovation of the species which constitute its habitual food, and the balance which Nature has established between the destroyed and the destroying, the sanguinary and their victims, be thus disarranged No doubt that (as is the case with all carnivorous animals) its numerical ratio in a given space is proportionate to that of the animals on which it is destined habitually to feed Where the sloth is most abundant, there will most abound the harpy eagle.

The general colour of this noble bird is slate-black, the head is light slate grey, passing into dusky black on the crest, the under parts are white, with a broad band of dark slate-colour across the chest The tail is barred with black and slate-colour The beak and claws are black, the tarsi yellow.

1217 to 1220 —THE LAMMERGEYER

(*Gypaetus barbatus*). Among the Raptorial birds, classed by naturalists under the Aquiline section

1215.—Harpy Eagle



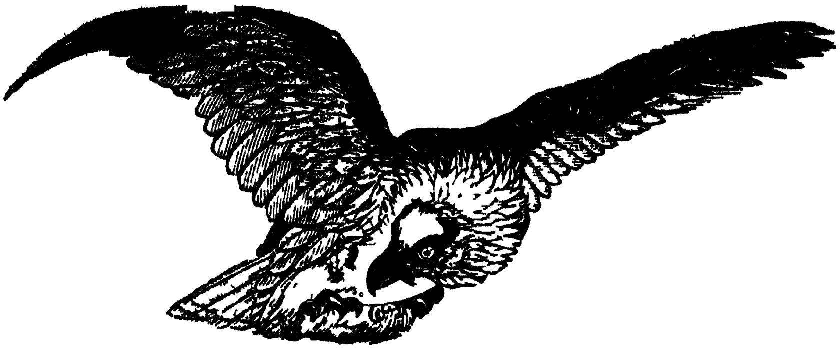
1213.—Head and Foot of Osprey.

1209.—White-headed Eagle and Fish-Hawk.

1216.—Harpy Eagle.

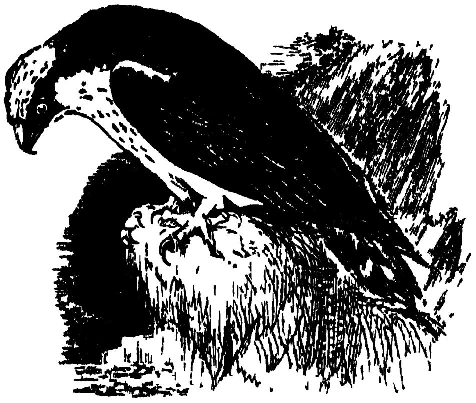
1211.—Osprey.

1214.—Barred Hæmatornis.



1819.—Lammergeyer

1820.—Lammergeyer



1812. Osprey

1817.—Lammergeyer.

1818.—Lammergeyer.

are many which have neither the bold bearing nor the ferocity and great powers of the genuine eagles, represented by the golden eagle or the harpy. Some form a series of intervening links between the eagles and the buzzards and kites, while others appear to hold an intermediate station between the eagles and the vultures. Among the latter may be instanced the lämmergeyer, which various writers, according to their different views, assigned to the vultures on the one hand or to the eagles on the other. Storr, a naturalist of great eminence, rescued it from the intermediate situation in which it previously stood, and founded for its reception a new genus, to which he gave the title of Gypaëtus (γὺψ, a vulture; ἀετὸς, an eagle), thereby alluding to its intermediate situation, though it still, in our opinion, comes within the pale of the Aquiline family. The characters of the genus are these:—head and neck clothed with feathers; nostrils covered with bristly hairs, which form a sort of pendent tuft or beard; bill elongated and hooked; tarsi short, and feathered to the toes, which are of considerable strength, and armed with sharp but slightly curved talons.

The lämmergeyer, or, as it is sometimes called, the bearded vulture, which equals or exceeds the largest eagle in size, is found throughout the whole of the great mountain-chains of the Old World, being in fact very widely dispersed. It occurs in the Pyrenees, and in the Alps of Germany and Switzerland, where it is notorious for its destructiveness among the lambs and kids which are fed on the green slopes of the lower ranges.

The intermediate situation assigned to the lämmergeyer, and which is aptly expressed in the generic appellation Gypaëtus, is clearly indicated in its form and general habits. Of a powerful and robust make, it has neither the bill nor the talons of the eagle, the former being elongated, and hooked only at the tip, and the latter comparatively small; yet it prefers to prey on victims which it has itself destroyed, or upon the flesh of animals recently slaughtered, and unless hard pressed by hunger rejects putrid carrion, the favourite repast of the vulture. The eagle bears off his prey; the lämmergeyer, unless disturbed, or providing for its young, seldom attempts to remove it, but devours it on the spot. Attracted by the carcass of some unfortunate animal which has recently perished among the ravines of the mountains, a number of these birds gradually congregate to share the booty, and gorge, like the vulture, to repletion. The lämmergeyer attacks hares, lambs, kids, and the weak and sickly of the flocks with great ferocity; the strong-limbed chamois is not secure, nor, when rendered desperate by hunger, will the ravenous bird forbear an attack on man. Children, indeed, are said to have often fallen sacrifices to its rapacity. Young or small animals are easily destroyed, for, though elongated, the beak is hard and strong, and well adapted for lacerating the victim; but larger animals, instead of being at once grappled with, are, as it is said, insidiously assaulted while upon the edge of some precipice or steep declivity, the bird unexpectedly sweeping upon them with fury, and hurrying them into the abyss, down which it plunges to glut its appetite. As illustrative of the boldness of the lämmergeyer, Bruce relates that, attracted by the preparations for dinner, which his servants were making on the summit of a lofty mountain, a bearded vulture "slowly made his advances to the party, and at length fairly seated himself within the ring they had formed. The affrighted natives ran for their lances and shields, and the bird, after an ineffectual attempt to abstract a portion of their meal from the boiling water, seized a large piece in each of his talons from a platter that stood by, and carried them off slowly along the ground as he came." Returning in a few minutes for a second freight, he was shot.

There is little in the general aspect of this bird to remind one of the vulture, and yet the character of the head and the general contour of the body are strikingly different from those of the eagle: there is a want of dignity and quiet grandeur in its attitude, and the glance of its small red eye, though keen and cruel, is deficient in that expression of daring and resolution which we admire in the feathered monarch. The bristly beard which depends from the lower mandible, tends also to give a peculiar character to its physiognomy. Of the nidification of the lämmergeyer little is ascertained, except that it selects the most inaccessible pinnacles, as the site of its eyrie. Pallas states that it is known to breed on the high rocks of the great Altaic chain, and beyond the lake Baikal.

The eggs are two in number, marked with brown blotches on a white ground.

In length this extraordinary bird measures about four feet from the bill to the end of the tail, and from nine to ten in the expanse of its wings. Larger admeasurements have been given by various writers, which are probably exaggerated—none of the numerous specimens which we have seen exceeding our statement. The tarsi are short and almost hidden by the feathers of the thighs; the iris is bright red; the wings are ample, the second and third quill-feathers being the longest; the tail is graduated: the head is clothed with feathers, and from the sides of the under mandible proceeds a row of black bristles, which form a beard or pencil at its angle, and a layer of similar bristles, beginning at the eye, covers the nostrils. The general colour of the upper surface is dark greyish brown, the centre of each feather having a longitudinal dash of white. The neck and the whole of the under surface are white, tinted with reddish brown. The young birds are darker in the general hue of their plumage than the adult, and the white spots are larger and less defined; in this stage it has been mistaken for a distinct species.

The flight of the lämmergeyer, as its great bodily powers, its ample wings and tail, sufficiently indicate, is sweeping and majestic. It sails round the Alpine summits, whence it marks its quarry from afar, and collecting all its energies for the onset, glides like an arrow upon its prey. If, however, it be lured from its aerial altitude by the carcass of some animal, it no longer emulates the eagle in its pounce, but calmly descending to some neighbouring crag, it then sets out, flying with heavy wings, at a short distance from the ground, towards its repast, to be joined by others of its species.

It would appear that in Europe this noble bird was formerly much more common than at present. It was once, as M. Temminck remarks, abundant on all the high mountains of Tyrol, Switzerland, and Germany, various hunters in the eighteenth century having killed their forty, fifty, or sixty lämmergeyers. The chasseur Andreas Durner had killed sixty with his own hand. In Sardinia it is still far from being rare. Specimens have been received from the north of Africa, and also from the Cape of Good Hope, differing in no respect from individuals belonging to the European Alps.

It occurs in the lofty mountains of Central Africa, and towards the borders of the Red Sea; and in Asia, tenants the chain of the Caucasus, the Himalayan, Siberian, and Persian mountains. The lämmergeyer is the Avoltoio barbuto of the Italians; and the Weisskōpfige Geier Adler of the Germans. According to Bruce, the Abyssinians call it Abou Duch'n, or Father Longbeard. He figures it under the title of Nisser, the Ethiopic for Eagle.

Passing from the lämmergeyer, various other aberrant forms, as the naturalist terms them, meet our attention, and claim a few remarks:—of these some are half vulturine in form as well as in habits.

1221.—THE AQUILINE IBYCTER

(*Ibycter aquilinus*). Head and foot. In the genus Ibycter the beak is convex above; the lower mandible notched at the apex and sub-acute; the cheeks, throat, and crop featherless; the claws acute.

The Aquiline Ibycter, the Petit Aigle d'Amérique of Buffon, is a native of South America, but of its peculiar habits we have no details. Gmelin regards it as the Red-throated Falcon of Latham. The colours of this bird are well contrasted; the beak is cerulean blue; the cere and feet are yellow; the iris is orange. The plumage above, deep blue; below, red passing into white: the feathers of the neck are of a purplish tint inclining to rufous: the claws are black.

1222.—THE BLACK DAPTRIUS

(*Daptrius ater*). Head and foot. It is not quite clear that this bird is generically separable from the preceding. The beak is shorter and stouter than in Ibycter, and the tarsi longer, but in other respects the characters closely correspond. They are evident links between the eagles, perhaps the sea or fishing eagles, and the vultures.

The present species is the Iribin noir of Vieillot; and the Caracara noir, Falco aterrimus of M. Temminck. Back with bluish reflexions; tail white at its base and rounded; beak and claws black; cere dusky; space round the eyes naked and flesh-coloured; feet yellow. Length about seventeen inches.

1223.—THE BRAZILIAN CARACARA OR CARRANCHA

(*Polyborus Brasiliensis*). Head and foot. The generic characters of Polyborus are these:—Beak compressed above, lower mandible entire and obtuse; cere large, and covered with hairs; cheeks and throat featherless; crop woolly.

The best account of the Caracara is given by Mr. Darwin ('Voyages of the Adventure and Beagle,' vol. iii.), who had many opportunities of observing these birds in a state of nature, and whose delineation of their habits is very interesting:—Speaking of the "Carrion Hawks," as he terms them, which frequent the extra-tropical parts of South America, he says, "the number, tameness, and disgusting habits of these birds make them pre-eminently striking to any one accustomed only to the birds of Northern Europe. In this list may be included four species of Caracara:—the Turkey Buzzard (a vulture, Vultur aura); the Gallinazo (a vulture, Cathartes atratus); and the Condor.

"The caracaras are, from their structure, placed among the eagles: we shall soon see how ill they become so high a rank. In their habits they well supply the place of our carrion-crows, magpies, and ravens, a tribe of birds totally wanting in South America. To begin with the Polyborus Brasiliensis.—This is a common bird, and has a wide geographical range; it is most numerous on the grassy savannahs of La Plata where it goes by the name of carrancha, and is far from unfrequent through the sterile plains of Patagonia. In the desert between the rivers Negro and Colorado numbers constantly attended the line of road to devour the carcasses of the exhausted animals which chanced to perish from fatigue and thirst. Although thus common in these dry and open countries, and likewise on the arid shores of the Pacific, it is nevertheless found inhabiting the damp impervious forests of West Patagonia and Tierra del Fuego. The carranchas, together with the Polyborus Chimango, constantly attend in numbers the estancias and slaughtering-houses. If an animal dies on the plain, the gallinazo commences the feast, and then the two kinds of caracara pick the bones clean. These birds, though thus commonly feeding together, are far from being friends. When the carrancha is quietly seated on the branch of a tree or on the ground, the chimango often continues for a long time flying backwards and forwards, up and down, in a semicircle, trying each time at the bottom of the curve to strike its larger relative. The carrancha takes little notice, except by bobbing its head. Although the carranchas frequently assemble in numbers, they are not gregarious, for in desert places they may be seen solitary, or more commonly in pairs. Besides the carrion of large animals, these birds frequent the borders of streams and sea-beaches to pick up whatever the waters may cast ashore. In Tierra del Fuego and on the west coast of Patagonia they must exclusively live on such supplies. The carranchas are said to be very crafty, and to steal great numbers of eggs. They attempt also, together with the chimango, to pick off the scabs from the backs of horses and mules. The poor animal on the one hand, with its ears down, and its back arched, and, on the other, the hovering bird eyeing at the distance of a yard the disgusting morsel, form a picture which has been described by Captain Head with his own peculiar spirit and accuracy. The carranchas kill wounded animals: but Mr. Bynoe saw one seize in the air a live partridge (ortyx?), which escaped, and was for some time chased on the ground. I believe this circumstance is very unusual; at all events there is no doubt that the chief part of their sustenance is derived from carrion. A person will discover the necrophagous habits of the carrancha by walking out on one of the desolate plains and there lying down to sleep. When he awakes, he will see on each surrounding hillock one of these birds patiently watching him with an evil eye. It is a feature in the landscape of these countries which will be recognised by every one who has wandered over them. If a party goes out hunting with dogs and horses, it will be accompanied during the day by several of these attendants. After feeding, the uncovered craw protrudes; at such times, and indeed generally, the carrancha is an inactive, tame, and cowardly bird. Its flight is heavy and slow, like that of an English rook. It seldom soars, but I have twice seen one at great height gliding through the air with much ease. It runs in contradistinction to hopping, but not quite so quickly as some of its congeners. At times the carrancha is noisy, but is not generally so; its cry is loud, very harsh, and peculiar, and may be likened to the sound of the Spanish guttural *g* followed by a rough double *r*. Perhaps the Gauchos from this cause have called it carrancha. Molina, who states that it is called Tharu in Chile, says that when uttering this cry it elevates its head higher and higher, till at last, with its beak wide open, the crown almost touches the lower part of the back. This fact, which has been doubted, is quite true. I have seen them several times with their heads backwards in a completely inverted position. The carrancha builds a large coarse nest, either in a low cliff or in a bush or lofty tree. To these observations, I may add, on the high authority of Azara, that the carrancha feeds on worms, shells, slugs, grasshoppers, and frogs; that it destroys new-fallen lambs, and that it pursues the gallinazo till that bird is compelled to disgorge the carrion it may recently have swallowed. Lastly, Azara states that several carranchas, five or six together, will unite in the chase of large birds, even such as herons. All these facts show that it is a bird of very versatile habits and considerable ingenuity."

The caracara, or carrancha, measures about twenty-two inches in length. The whole upper surface of the head is black, with the feathers slightly elongated backwards, and capable of being partially elevated in the shape of a pointed crest. The entire neck is of a light brownish grey, which also forms the ground-colour on the breast and shoulders, but with the addition on these parts of numerous transverse wavy bars of a deeper brown. Nearly all the rest of the plumage is of a tolerably uniform shade of blackish brown, with the exception of the tail, which is at the base of a dirty white, with numerous narrow, transverse, undulated bands of a dusky hue, and, in its terminal third, black without any appearance of banding. The beak is horn-coloured at the tip and bluish at the base; the iris hazel; the cere and naked cheeks of a dull red; the legs yellow, and the claws black. Such at least are the colours of the living specimen in the Society's Garden. Several changes, however, take place in the plumage of the bird as it advances in age.

With respect to the Polyborus Chimango, noticed by Mr. Darwin, and which is smaller than the carrancha, we may observe that it is common on both sides of the same continent. It is found in Chiloe and on the coast of Patagonia, but does not appear to inhabit Tierra del Fuego. It feeds on carrion, and is the last bird to leave the carcass, and, as Mr. Darwin says, may be often seen within the bare ribs of a cow or horse, like a bird in a cage. The chimango, he adds, "often frequents the sea-coast, and the borders of lakes and swamps, where it picks up small fish. It is truly omnivorous, and will even eat bread when thrown out of the house with other offal. I was assured that they materially injure the potato crops in Chiloe, by grubbing up the roots when first planted. In the same island I myself saw them by scores following the plough, and feeding on the worms and larvæ of insects. I do not believe they ever kill birds or quadrupeds. They are more active than the carranchas, but their flight is heavy; I never saw one soar. They are very tame, but are not gregarious; they commonly perch on stone walls, and not upon trees, and frequently utter a gentle shrill scream."

Mr. Darwin notices a third species of Polyborus, of rare occurrence, and which he only met with in one valley of Patagonia. The fourth species to which he alludes is the Polyborus Novæ Zelandiæ. This bird, he remarks, is exceedingly numerous over the whole of the Falkland Islands, which appear to constitute its metropolis. He was informed by the sealers, that they are found on the Diego Ramirez Rocks, but never on the mainland of Tierra del Fuego, nor on Georgia or the more southward islands. In habits and manners they resemble in many respects the carranchas, living on the flesh of dead animals, and on marine productions, which latter on the Ramirez rocks must constitute their principal, if not their sole subsistence. They are ordinarily tame and fearless, and confidently haunt the precincts of houses for offal. When, he adds, a hunting-party kills any animal, a number of these birds soon collect, and wait patiently, standing on the ground on all sides. After gorging themselves, their uncovered craws are largely protruded, giving them a disgusting appearance.

"They readily attack wounded birds; a cormorant in this state having taken to the shore, was immediately seized on by several, and its death hastened by their blows. The Beagle was at the Falklands only during the summer, but the officers of the Adventure, who were there in the winter, mention many extraordinary instances of the boldness and rapacity of these birds. They actually made an attack on a dog that was lying asleep close to one of the party; and the sportsmen had difficulty in preventing the wounded geese from being seized before their eyes. It is said that several together wait at the mouth of a rabbit-hole, as is the practice also of the carranchas, and seize on the animal when it comes out. They were constantly flying on board the vessel when in the harbour; and it was necessary to keep a good look-out, to prevent the leather being torn from the rigging, and the meat or game from the stern. These birds are very mischievous and inquisitive; they will pick up almost anything from the ground; a large-sized glazed hat was carried nearly a mile, as was a pair of heavy balls (bolas) used in catching cattle. Mr. Usborne experienced, during the survey, a more severe loss, in their stealing a small Kater's compass, in a red morocco leather case, which was never recovered. These birds are, moreover, quarrelsome and very passionate, tearing up the grass with their bills from rage. They are not truly gregarious, and do not soar. Their flight is heavy and clumsy, but on the ground they run with extreme quickness, very much like pheasants. They are noisy, uttering several harsh cries, one of which is like that of the English rook; hence the sealers always so call them. It is a curious circumstance that when crying they always throw their heads upwards and backwards, after the same manner as the carrancha. They build on the rocky cliffs of the sea-coast, but only in the small islets, and not in the two main islands. This is a singular precaution in so tame and fearless a bird. The sealers say that the flesh of these birds, when cooked, is quite white, and very good eating."

These rapacious birds are, as the above details sufficiently prove, vulturine in their habits, and have no immediate relationship to the true eagles; they evidently compose a distinct group. The following species seem to exhibit an alliance with the buzzards and harriers, which they resemble in form and modes of life.

1224.—The Urubitinga, or Brazilian Eagle of Latham

(*Morphnus Urubitinga*). Head and foot. The characters of the genus Morphnus may be thus summed up:—beak convex above; nostrils elliptical; tarsi elevated, scutellated anteriorly; sometimes feathered toes rather short; claws acute.

The Urubitinga is a native of Brazil and Guiana, frequenting water, humid grounds, and inundated places, where it seeks its prey, consisting of small animals. The general plumage is dusky black, the wings being waved with ash-colour, the tail-coverts and base of tail white; the beak is strong; the eyes large; the cere and legs are yellow; claws black. The young of the year are blackish yellow below, each feather having a central dash or spot of blackish brown. The throat and cheeks are marked with brown streaks on a whitish ground.

1225.—The Crested Morphnus, or Huppart

(*Morphnus occipitalis*). Head and foot. This is the Aigle-Autour, Noir Huppé d'Afrique, the Falco occipitalis of Daudin. Its tarsi are closely feathered to the toes. This species is a native of Africa, where it seems to be almost universally spread. It equals a raven in size. The plumage is black, and a crest of long feathers ornaments the back of the head.

1226.—The Hook-billed Cymindis

(*Cymindis hamatus*). Beak and foot. There are, says Cuvier, Raptorial birds in America with a beak like the preceding species, with tarsi short and reticulated, and half covered anteriorly with feathers, and with wings shorter than the tail, and whose distinctive feature consists in the nostrils being nearly closed, bearing the appearance of a narrow slit. Of these, one is the present species, which, however, has the tarsi scutellated anteriorly, and the upper mandible very much hooked. This bird inhabits Brazil, and when adult is of a uniform lead-colour, the cere and feet being yellow. Length about seventeen inches. The young of the year have the plumage of a sombre brown, each feather being bordered and blotched with red; the cheeks are marked with yellowish rashes, and a stripe of the same colour runs below the eyes; the front of the neck is whitish.

1227.—The Cayenne Cymindis

(*Cymindis Cayennensis*). Head and foot. This species, which inhabits Cayenne, has a small tooth-like projection on the edge of the beak where it begins to curve down. The adult is white with a blue-black mantle, the head ash-coloured, and the tail barred with four white bands. In the young the mantle is variegated with brown and red, and the head is white with a few black dashes. It is the Petit Autour de Cayenne of Buffon.

1228.—Grey Asturina

(*Asturina cinerea*). Head and foot. Generic characters:—beak convex above; nostrils lunulate; tarsi short and somewhat slender; claws long and very acute.

The Grey Asturina is a native of Guiana. The general plumage is of a bluish ash-colour, with whitish bands on the under part of the body. The tail, which is white at the point, is traversed by two black bands. Beak blue; cere yellow. Of its habits we have no particular details.

1229.—The Short-toed Circaetus

(*Circaetus brachydactylus*). Head and foot. This bird is the Aigle Jean-le-Blanc of Temminck; Falco Gallicus, Gmelin; Falco leucopsis, Bechstein.

The genus Circaëtus, says Cuvier, holds an intermediate station between the fishing eagles, the osprey, and the buzzards: the wings resemble those of the eagles and buzzards, while the tarsi are reticulated, as in the osprey. The external toe is united to the middle by a short membrane.

The Short-toed Circaëtus, or Jean-le-Blanc, is a native of Europe and Asia; it is found in the great fir-forests on the eastern parts of northern Europe, but is elsewhere not very common. It is, in fact, never seen in England or Holland, and is rare in France. It is occasionally observed in Italy.

In size, this species exceeds the osprey, but its toes are proportionally short, though powerful Its manners are those of a buzzard; it feeds on snakes and other reptiles, and small quadrupeds, rarely on birds or domestic poultry. It builds its nest on the highest trees, and the eggs are two or three in number, of a lustrous grey, and spotless. Colonel Sykes notices it among the birds of the Dukhun, and states that in the stomach of a female which he shot were found the remains of a snake and two rats. Its length was thirty inches.

Description of Old Male.—Head very large; below the eyes a space clothed with white down; summit of the head, cheeks, throat, breast, and belly white, but variegated with a few spots of bright brown; back and coverts of the wings brown, but the origin of all the feathers of a pure white; tail square, grey brown, barred with deeper brown, white below; tarsi long and greyish blue, as are the toes; beak black; cere bluish; iris yellow.

Of Female.—Less white than the male. The head, the neck, the breast, and the belly are marked with numerous brown spots, which are very much approximated.

Of Young.—Upper parts darker, but the origin of the feathers pure white; throat, breast, and belly of a red-brown, little or not at all spotted with white; bands on the tail nearly imperceptible; beak bluish; feet greyish white.

1230, 1231.—The Secretary.

Among the aberrant forms of the Aquiline group must be placed this extraordinary bird, which to naturalists has been a sort of "Petrum scandali et lapsis offensionis." Some have placed it among the vultures, others among the Gallinaceous birds, and others among the Wading birds, as did Vieillot, after repeatedly changing his opinions.

That naturalists should have assigned it to the Gallinaceous or the Wading orders, with the former of which it has nothing in common, and with the latter only the elevation of the tarsi, is indeed not a little surprising. With respect to the vultures, it exhibits but little affinity to them: Fig. 1232 represents the Head of the Secretary in two views; the short abruptly hooked beak, the large eye, the overhanging brows, with a row of strong black bristles, the breadth of the head across the top of the skull, and the occipital plumes are anything but characteristic of the vulture; whereas in many of the genera intermediate between the eagles and the hawks, we trace these characteristics, conjoined with that length of limb which fits them for terrestrial habits, and which is carried to its ultimate in the Secretary.

It is among these aberrant terrestrial Falconidæ, feeding on reptiles and small quadrupeds, that we consider the genus Gypogeranus to stand The generic characters of this genus are as follows:—Bill rather slender, shorter than the head, strong, very much hooked and curved nearly from its origin; cere extending almost naked over the cheeks; nostrils diagonal, oblong; tarsi long and slender; toes short, rough below, hind-toe articulated higher than the anterior toes; wings long, armed near the elbow-joint with obtuse spurs; five first quill-feathers the longest and nearly equal; occipital plume; the two middle tail-feathers longer than the others.

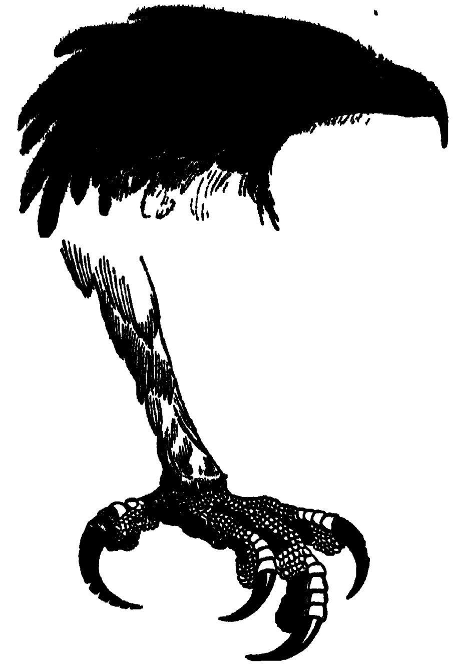
It is not quite clear whether there are not, in reality, three distinct species of Secretary: one inhabiting the regions of South Africa: one, Senegambia; and one, the Philippine Islands, north of Borneo.

In some interesting observations on the genus Gypogeranus, by Mr. Ogilby ('Zool. Proceeds,' 1835, p.104), that naturalist gives certain distinctive characters, from which it would appear that the Philippine bird at least (whatever the Senegambian may hereafter prove to be) is distinct from the South African.

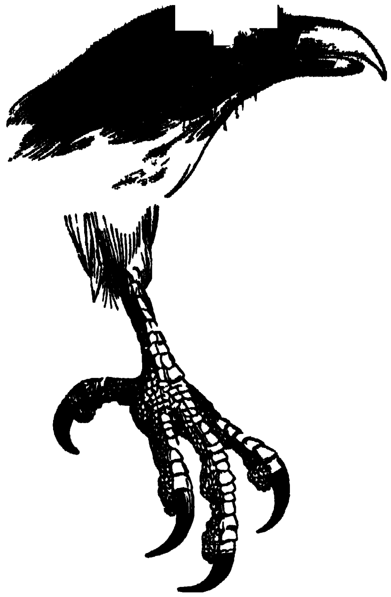
South African Secretary (G. Capensis, Ogilby).—"With the plume of long cervical feathers commencing upon the occiput spreading irregularly over the upper part of the neck, narrow throughout the greater part of their length, as if the vane had been cut on each side, close to the shaft of the quill, spreading only at the point."

Senegambia Secretary (G. Gambiensis, Ogilby).—"With the cervical crest commencing some distance below the occiput, arranged in two regular series, one on each side of the neck, with the intermediate space clear, and composed of long spatule-shaped feathers, much broader throughout than in the last species, though similarly decreasing in width towards the root. In both these species the two middle feathers of the tail are considerably longer than the others."

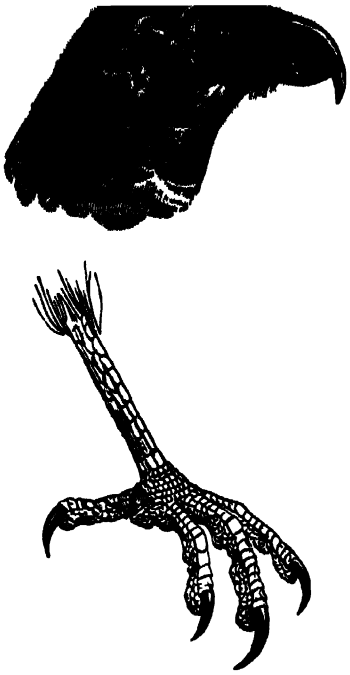
Philippine Secretary (G. Philippensis, Ogilby).—"With the cervical crest spread irregularly from the occiput to the bottom of the neck, the longest feathers being those situated the lowest, which is just the reverse of what we observe in Gyp. Gambiensis, and with the two exterior tail-feathers the longest, so that the tail appears forked. This is



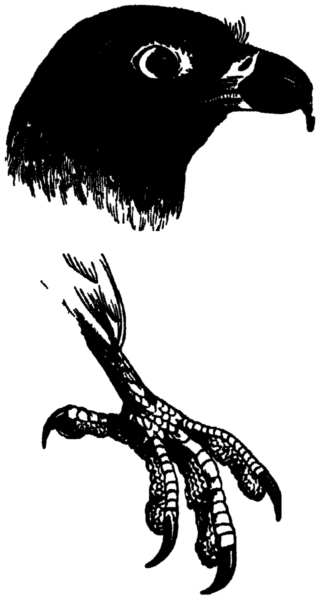
1223.—Head and Foot of Crested Morphnus



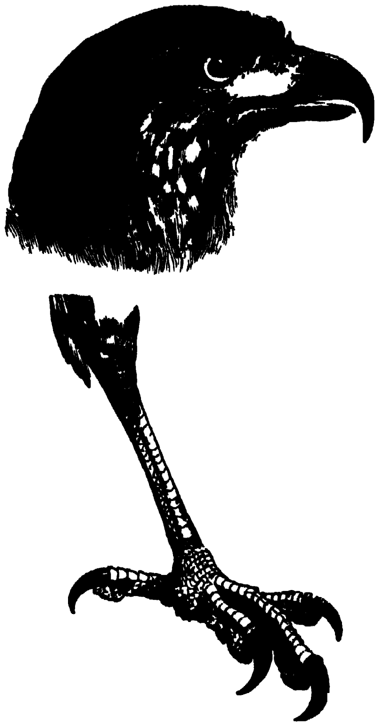
1221.—Head and Foot of Aquiline Ibycter



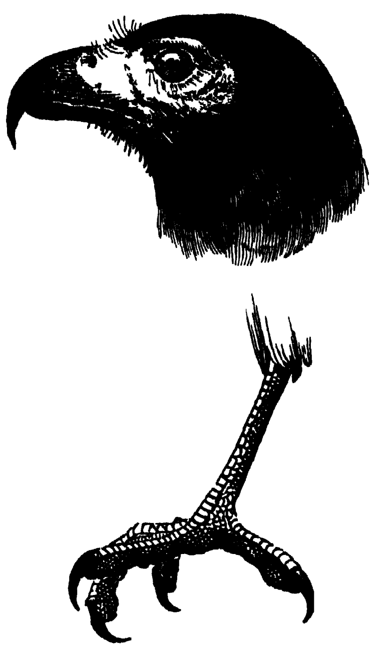
1228.—Head and Foot of Grey Astur



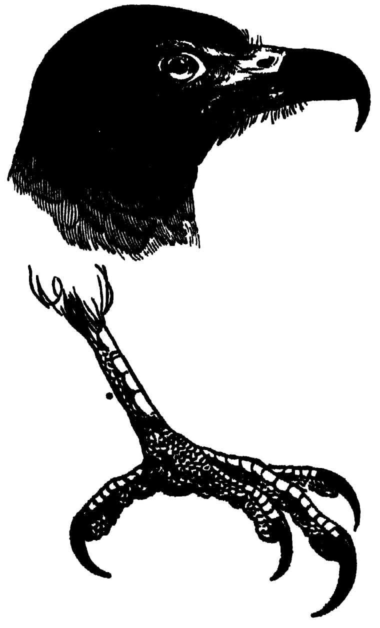
1227.—Head and Foot of Cayenne Cymindis.



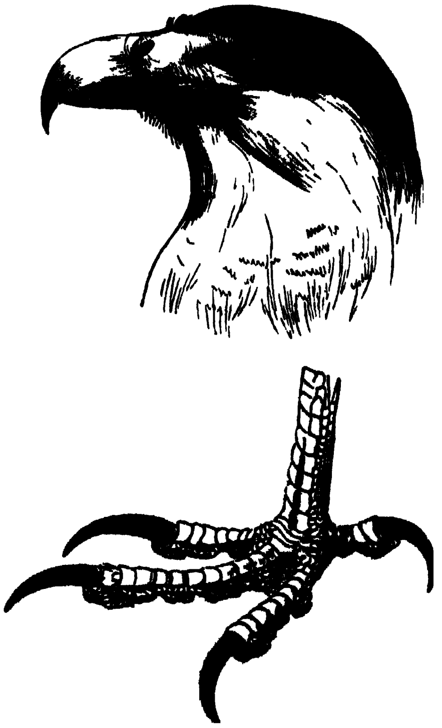
1224.—Head and Foot of Brazilian Eagle



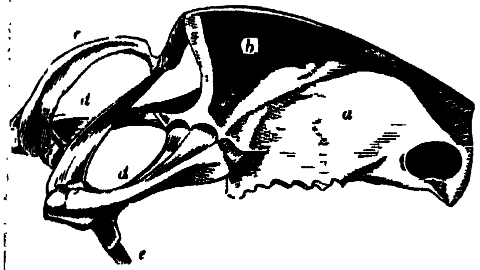
1222.—Head and Foot of Black Daptrius.



1226.—Head and Foot of Hook-billed Cymindis.

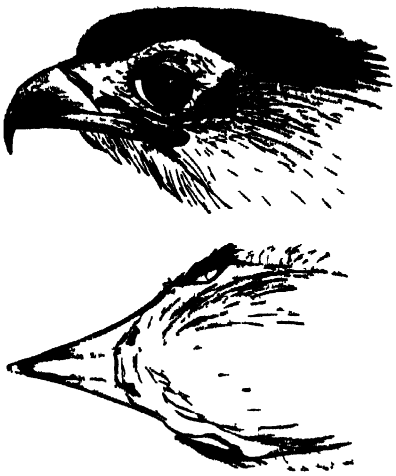


1224.—Head of Peregrine Falcon.



1228.—Breast-bone of Peregrine Falcon.

1225.—Foot of Peregrine Falcon.



1232.—Head of Secretary-bird.

1230.—Secretary-birds.

1226.—Peregrine Falcon.

1227.—Peregrine Falcons.

1231.—Secretary-bird.

apparent not only in Sonnerat's figure, but is expressly mentioned in his detailed description, and, if confirmed by future observation, is clearly indicative of a specific distinction. Inhabits the Philippine Islands. Described and figured in Sonnerat's 'Voyage à la Nouvelle Guinée,' p. 87, t. 50.* The colours of the three species or varieties here indicated do not seem to be materially different in other respects." It is to the South African species or variety that our details more particularly apply.

This singular bird is termed, in allusion to its habits, Slangen-vreeter, or Serpent-eater, by the Dutch colonists of the Cape, and its Hottentot name has the same meaning: snakes, in fact, constitute its principal food, and in the attack and defence it displays the greatest coolness and address. The Slangen-vreeter, says Sparrman, has a peculiar method of seizing upon serpents. When it approaches them, it always takes care to hold the point of one of its wings before it, in order to parry off their venomous bites; sometimes it finds an opportunity of spurning and treading upon its antagonist, or else of taking it up on its pinions and throwing it into the air: when by this method of proceeding it has at length wearied out its adversary, and rendered it almost senseless, it then kills it and swallows it without danger. Though I have very frequently seen the Secretary Bird, both in its wild and tame state, yet I have never had an opportunity of seeing this method it has of catching serpents; however, I can by no means harbour any doubt concerning it, after having had it confirmed to me by so many Hottentots as well as Christians, and since this bird has been observed at the menagerie at the Hague to amuse and exercise itself in the same manner with a straw. If, finally, this Serpent-eater is to be referred to the Accipitres, or the Hawk kind, the name of Falco serpentarius appears to be the most proper to distinguish it by in the 'Systema Naturæ. It has ever been remarked that these birds, when tame, will not disdain now and then to put up with a nice chicken.

Sparrman, it is true, did not himself see the scene which he describes; but his account is confirmed by Le Vaillant, who thus gives the results of his own observations, which go to prove, contrary to Buffon's statement, that the Secretary is bold and courageous.

"In descending from a mountain into a very deep bog (fondrière), I perceived, nearly perpendicularly below me, a bird which raised and lowered itself very rapidly, with very extraordinary motions. Although I well knew the Secretary, and had killed many of these birds at Natal, it was impossible for me to recognise it in the vertical situation in which I found myself, and I only suspected that it was one from its bearing. Having found means, by favour of some rocks, to approach sufficiently near, noiselessly, and without being discovered, I found that this bird was a Secretary combating a serpent. The fight was very sharp on both sides, and the skill (la ruse) equal on the part of each of the combatants. But the serpent, which perceived the inequality of its strength, employed that adroit cunning which is attributed to it, in order to save itself by flight and regain its hole; while the bird, divining its intention, stopped it at once, and throwing itself before the serpent by one spring, cut off its retreat. Wherever the reptile essayed to escape, there it always found its enemy. Then, uniting skill with courage, it erected itself fiercely to intimidate the bird, and presented, with a frightful hiss, a menacing gape, inflamed eyes, and a head swollen with rage and poison. Sometimes this offensive resistance suspended hostilities for an instant; but the bird soon returned to the charge, and covering its body with one of its wings, as with a shield, struck its enemy with the other, with the bony protuberances of which I have already spoken, and which, like small clubs, overpowered it the more surely, inasmuch as it presented itself to the blows. In effect, I saw it reel and fall extended: then the conqueror threw himself upon it to finish his work, and with one blow of the bill split its skull. At this moment, having no further observations to make, I killed it. I found in its crop (for it has one, which nobody has stated), on dissecting it, eleven rather large lizards, three serpents, as long as one's arm, eleven small tortoises very entire, many of which were about two inches in diameter, and, finally, a quantity of locusts (sauterelles) and insects, the greater part of which were sufficiently whole to deserve being collected and to be added to my specimens. The lizards, the serpents, and the tortoises had all received the stroke of the bill on the head. I observed besides, that, independently of this mass of aliments, the craw (poche) of the animal contained a species of pellet, as large as a goose's egg, and formed of the vertebræ of serpents and lizards which the bird had devoured previously, scales of small tortoises, and the wings, feet, and corselets of different scarabæi. Doubtless when the undigested mass is become too large, the Secretary, like other birds of prey, vomits it and gets rid of it. It results from the superabundant quantity of nourishment which this specimen had secured, that in attacking the serpent of the bog it was not hunger which had stimulated it to the combat, but the hatred and antipathy which is bears to these reptiles. Such an aversion as this is of an inappreciable advantage in a country where the temperature wonderfully favours the multiplication of an infinity of noxious and venomous animals. In this point of view the Secretary is one of nature's real benefactions; and indeed its utility and the services rendered by it are so well recognized at the Cape and in its neighbourhood, that the colonists and Hottentots respect it and do not kill it: herein imitating the Dutch, who do not kill the stork, and the Egyptians, who never injure the ibis. The secretary is easily tamed, and when domesticated, every kind of nourishment, cooked or raw, agrees with it equally.

"The eggs ordinarily amount to from two to three, nearly as large as those of a goose, and white, like those of a hen. The young remain a long time before they quit the nest, because, their legs being long and slender, they sustain themselves with difficulty. They may be observed, even up to the age of four months, unable to progress, except by leaning on their heels; which gives them a strikingly clumsy and ungraceful air. Nevertheless, as their toes are not so long nor their claws so curved as the other birds of prey, they walk with much more facility than those. So that when they have attained the age of seven months they may be seen to develop easy and graceful movements which suit well with their noble bearing."

M. Lesson, in his description, quotes the account of Mr. Smith, who relates, "that one day he saw a Secretary take two or three turns on the wing at a little distance from the place where he was. The bird soon settled, and Mr. Smith saw that it was attentively examining an object near the spot where it had descended. After approaching it with great precaution, the Secretary extended one of its wings, which the bird continually agitated. Mr. Smith then discovered a large serpent raising its head, and appearing to wait the approach of the bird to dart upon it; but a quick blow of the wing soon laid it prostrate. The bird appeared to wait for the serpent's raising itself, in order to repeat the blow; but this the serpent, it seems, did not attempt, and the Secretary, walking towards it, seized it with the feet and bill, and rose perpendicularly into the air, whence the bird let the serpent fall on the ground, so that it might be securely destroyed."

The Secretary was so called by the Dutch from the plumes at the back of its head, which reminded them of the pen stuck behind the ear, according to the custom of the 'gens de cabinet' in Holland, and the name has since been generally adopted. These birds, at least in South Africa, are not gregarious, but live in pairs, and build on high trees or in dense thickets. Their gait is a singular stalk, reminding us of a person moving along on elevated stilts; but they run with great swiftness, and are not to be approached without difficulty by the sportsman. Attempts have been made, how far successful we know not, to introduce this bird into Martinique, for the purpose of destroying the deadly lance-headed viper, or yellow serpent, of the Antilles (Trigonocephalus lanceolatus), which abounds there, and is greatly dreaded.

The general colour of this species is bluish grey; the primary and secondary quill-feathers are black, as are also the feathers of the thighs, and those composing the crest. The two long middle tail-feathers are grey, becoming black towards their extremities, and ending in a white tip, as do the rest of the tail-feathers, which are otherwise black. Length of head and body, including the tail, three feet.

FALCONS.

Among all the Raptorial birds, none are more bold and daring than the falcons, though there are certain exceptions. All are formed for rapid flight, and pursue their prey with extreme velocity, or soaring above, descend upon it with a swoop, bearing it to the ground. Some, as the kestrels, which feed principally on frogs and mice, not excluding insects, sail in the air performing easy circles, and often appear motionless over one spot for a considerable time; when, perceiving their prey, they make a sudden and rapid descent, and pounce upon it with unerring certainty. But the nobler falcons, as they are termed—viz., the peregrine and gerfalcon, which prey chiefly on birds, as pigeons, grouse, sea-fowl, &c., strike their victim on the wing, and carry it in their talons to their eyry.

The falcons are distinguished by the following characters: the beak is short, strong, and abruptly hooked, the edge of the upper mandible, near the curve, being furnished with a tooth-like projection. The wings are long and pointed, the second quill feather being the longest. The tarsi are of moderate length, but stout; the toes are long and powerful, and armed with large, sharp, retractile claws. The eye is full, bright, and beautiful; the contour of the body graceful and vigorous: the plumage close and compact. The muscles of flight are remarkably developed, as indicated by the breadth of the sternum, the depth of the keel, and the strength of the furcula, and of the calvicular or coracoid bones. Fig. 1233 represents the sternum of the Peregrine Falcon and its appendages: *a*, the expanse of the sternum; *b*, the keel; *c*, the furcula; *d*, the clavicular or coracoid bones; *e*, the scapula broken off. Fig. 1234 represents the Head of the Peregrine Falcon as illustrative of the generic characters of the group; Fig. 1235, the Foot.

1236, 1237.—THE PEREGRINE FALCON

(*Falco peregrinus*). This beautiful and once highly valued bird is very widely spread, being found in most of the bold and rocky districts of Europe, Asia, and North America. Everywhere it seems to be a bird of passage, whence its specific name *peregrinus*. As regards the British Islands, it is common in Scotland and Wales, building on high precipitous rocks bordering the sea-coast. It frequents similar situations in Devonshire and Cornwall, where it is called the Cliff-hawk: and we have seen fine specimens procured on the Needles in the Isle of Wight. In many parts of Ireland it is abundant. "In the four maritime counties of Ulster," says Mr. Thompson, "it has many eyries: and in Antrim, whose basaltic precipices are favourable for this purpose, seven, at least, might be enumerated; of these one only is inland; at the Gobbins, regularly frequented by a pair, there were two nests in one year within an extent of rock considerably less than a mile." There are eyries also at the Horn in Donegal, and many other places. The peregrine falcon is however often seen inland, and is known to take up its temporary residence on St. Paul's Cathedral and Westminster Abbey, making havoc among the flocks of pigeons in the neighbourhood. We once saw a pigeon in Leicester Square struck and carried off by one of these birds. In the days of falconry the courage, power, docility, and swiftness of the peregrine falcon rendered it a great favourite, and according to age, sex, &c. it received different appellations. When wild or yet unreclaimed, it was termed a haggard; hence the sentence in Shakspere ('Much Ado about Nothing'), "As coy and wild as haggards of the rock" (see Fig. 1237). The young bird was called eyess, a corruption of the French word *niais*; it was also named red hawk, from the colour of its plumage during the first year. The male bird was termed tiercel, tersel, or tassel; "tassel-gentle," a reclaimed male. The female was called "falcon" par excellence. This bird has by some writers been called the Lanner, but the true lanner, which is a distinct, though an allied species (Falco lanarius), is found only in Asia and the south-eastern parts of Europe, and has never been seen wild in the British Islands. It is to the peregrine falcon that Pennant alludes (and after him Bewick), when treating of the lanner he remarks "this species breeds in Ireland." Besides these names the peregrine falcon has various other appellations, as the Slight Hawk and the Passenger Falcon. In America it is termed the Duck-Hawk, from the havoc it makes among wild-ducks; and also the Great-footed Hawk, from the size and strength of its talons. Of the prowess and daring of the peregrine many instances are on record. Mr. Thompson ('Mag. Zool. and Botan.,' vol. ii. p. 53) observes that "Mr. Sinclair, when on one occasion exercising his dogs on the Belfast mountains towards the end of July, preparatory to grouse shooting, saw them point; and on coming up he startled a male peregrine falcon off a grouse (Tetrao scoticus) just killed by him; and very near the same place he came upon the female bird, also on a grouse. Although my friend lifted both the dead birds, the hawks continued flying about, and on the remainder of the pack (of grouse), which lay near, being sprung by the dogs, either three or four more grouse were struck down by them, and thus two and a half or three brace were obtained by means of these wild birds, being more than had ever been procured out of a pack of grouse by his trained falcons." The peregrine falcon attacks its prey only while on the wing, seldom pursuing it into dense cover; and it has been observed that birds thus driven to shelter by the peregrine falcon are so terrified, that rather than venture again on wing they will allow themselves to be captured by the hand. Even the black cock has been known to be thus taken. Mr. Thompson says the strike of this species is more fatal than its clutch, and that when flown at rooks it has been known to strike down several in succession before alighting to prey on one; and he adds, "an eye-witness to the fact assures me that he once saw a falcon strike down five partridges out of a covey one after the other. but such occurrences are rare." Mr. Selby, in his 'British Ornithology,' gives a similar instance of daring to that related by Mr. Thompson, from the account of Mr. Sinclair. "In exercising my dogs upon the moors previous to the commencement of the shooting season, I observed a large bird of the hawk genus hovering at a distance, which upon approaching I knew to be a peregrine falcon. Its attention was now drawn towards the dogs, and it accompanied them while they beat the surrounding ground. Upon their having found and sprung a brood of grouse, the falcon immediately gave chase and struck a young bird before they had proceeded far upon the wing My shouts and rapid advance prevented it from securing its prey. The issue of this attempt, however, did not deter the falcon from watching our subsequent movements, and another opportunity soon offering, it again gave chase and struck down two birds by two rapidly repeated blows, one of which it secured and bore off in triumph." The flight of this falcon when pursuing its quarry is astonishingly rapid. Montagu has reckoned it at one hundred and fifty miles an hour, and Colonel Thornton, an expert falconer, estimated the flight of one in pursuit of a snipe to have been nine miles in eleven minutes, without including the frequent turnings. Audubon, in his 'Birds of America,' states that he has seen this falcon come at the report of a gun, and carry off a teal not thirty steps distant from the sportsman who had killed it, "with a daring assurance as surprising as unexpected"

---

* Speaking of the manners of this bird, Sonnerat says, that it is sociable and lives in a state of domesticity; that it hunts rats, and might in this point of view become useful in the colonies, where it would probably not be difficult to multiply it. Although he erroneously describes the bill and feet of the Secretary (Philippine) as resembling those of Gallinaceous birds (fowl, turkey, &c.), he states that it feeds on flesh, and ought consequently to be placed in the ranks of the birds of prey, among which, he adds, it forms an entirely insulated genus.

This singular aptitude in the wild bird to join men and dogs in their pursuit of game, availing itself of their assistance, shows at once the little trouble, comparatively speaking, requisite for reclaiming and training it A knowledge of the service rendered by dogs and men in putting up game, thereby giving it the opportunity of striking it, is intuitive. In disposition it is confident and docile; and with patience, kind treatment, and proper management, its training is soon effected

The peregrine falcon breeds on the ledges of precipitous rocks, laying four eggs, of a reddish-brown colour, with darker blotches and variegations

With respect to the distribution of this species in America, Dr Richardson, who describes an old male from Melville Peninsula, lat 68 N., says ('Fauna Boreali-Americana'), "The peregrine being a rare bird in the wooded districts of the fur countries where the trading-posts are established, I did not procure a specimen on the late expeditions, but I have frequently seen it whilst on the march across the Barren Grounds Of the two specimens figured by Edwards, one was from Hudson's Bay and the other was caught off the entrance of Hudson's Straits Captain Parry likewise brought home several male and female specimens from Melville Peninsula, some of which are preserved in the British Museum It is a summer visiter of the northern parts of America, and frequents the coasts of the Hudson's Bay and the Arctic Sea, with the Barren Grounds, but is very seldom seen in the interior. It preys habitually on the long-tailed ducks Anas glacialis), which breed in great numbers in the arctic regions, arriving in June and departing in September Captain Parry observed it in his second voyage following flocks of the snow-bunting on the coast of Greenland, near Cape Farewell. It frequents the shores of New Jersey and Pennsylvania in the winter, and is celebrated there for the havoc it makes among the water-fowl Mr. Ord states that the ducks which are struck by it are lacerated from the neck to the rump, it gives the low in passing, and returns to pick up its bird" According to Captain King, it is found at the Straits of Magalhaens

Like all the Falconidæ, this bird undergoes successive variations of colouring before attaining its permanent livery. When young, the plumage on the back inclines to rufous, the middle of each feather only having a tint of deep bluish ash, and the under parts being white, with brown longitudinal dashes. The colouring of the adult is as follows — Head and back of the neck blackish lead colour, which colour, as it extends over the back, assumes a more ashy tinge; below the eye is a large triangular mark of dark lead colour, pointing downwards. and commonly called the moustache—this mark is a common feature in many others of the genus. The throat and breast are white, with a few slender dashes of brown; the under parts are dirty white. with fine transverse bars of brown The tail is alternately barred with bluish grey and black. Cere, eyelids, and tarsi yellow; iris dark hazel brown; claws black.

Fig. 1238 represents a peregrine falcon about to strike a partridge; Fig. 1239, "a hawk on fist," with hood and bells; Figs. 1240, 1241, 1242, 1243, 1244, and 1245, are illustrative of the not yet exploded practice of Falconry; an art which in former days engaged the most earnest attention, and is still a common amusement among the Turks, in some parts of Asia Minor, among the Persians, Circassians, and the wandering hordes of Turkomans and Tartars Hawking appears to have been introduced into England from the North of Europe during the fourth century Our Saxon ancestors became passionately fond of the sport, but do not appear to have made great progress in the art of training the birds In the eighth century, one of the kings of that race caused a letter to be written to Winifred, Archbishop of Mons, begging the dignitary to send him some falcons that had been well trained to kill cranes The month of October was more particularly devoted to that sport by the Saxons We are indebted to our fierce invaders the Danes for many improvements in Falconry Denmark and still more Norway were always celebrated for their breeds of hawks, and the natives of these countries had attained an extraordinary degree of skill in the art of training them In the eleventh century, when Canute, King of Denmark and Norway, ascended the English throne, the sport became more prevalent We are not aware of what restrictions were imposed under the Saxon or Danish monarchs but after the conquest by William of Normandy none but persons of the highest rank were allowed to keep hawks Cruel laws with respect to field-sports were framed and rigorously executed by the first princes of our Norman dynasty According to the liberal views of those times, the people were held utterly unworthy of partaking anything except the air of heaven in common with their noble oppressors The life of a serf was of less value in the eyes of a Norman baron than that of a buck, a hound, or a hawk, and in those days the mass of what we now call the people were serfs and slaves As to the keeping of falcons, the great expense attending it put it entirely out of the power of the commonalty, but the prohibitive Norman law was probably meant at first to extend to such of the Saxon landholders as were rich and remained free, but had no rank or nobility according to the conqueror's estimation. In the days of John however, every *freeman* was most liberally permitted to have eyries of hawks, falcons, eagles, and herons, in *his own woods* In the year 1481 was printed the 'Book of St. Albans,' by Juliana Berners, sister of Lord Berners and prioress of the nunnery of Sopwell It consisted of two tracts, one on hawking, the other on heraldry. The noble dame obtained from her grateful contemporaries the praise of being "a second Minerva in her studies, and another Diana in her diversions" Her subject was well chosen, hawking was then the standing pastime of the noble, and the lady abbess treated it in the manner the most likely to please The book became to falconers what Hoyle's has since become to whist players, but the dame Juliana's had moreover the merit of paying proper homage to the jealous distinctions between man and man, as then established According to the 'Book of St Albans there was a nice adaptation of the different kinds of falcons to different ranks Thus, such species of hawks were for kings, and could not be used by any person of inferior dignity,—such for princes of the blood, such others for the duke and great lord and so on, down to the knave or servant In all there were fifteen grades, but whether this number was so small owing to the species of birds, or because it included all the factitious divisions of society then recognised, we cannot well determine We have too much respect for the patience of our readers to follow the dame through all her directions, to which additions have been made in the fifteenth and seventeenth centuries We would rather accompany the trained hawks into the field

Strutt, in his industrious work on the 'Sports and Pastimes of the English,' gives one or two engravings, from very old pictures, representing ladies followed by dogs, and running on foot, with their hawks on their fists, to cast them off at game Indeed, John of Salisbury, who wrote in the thirteenth century, says that the women even excelled the men in the knowledge and practice of falconry, whence he ungallantly takes occasion to call the sport itself frivolous and effeminate Taken altogether, however, a hunting party of this kind, composed of knights and dames, mounted on their piaffing manège horses,

"Ryding or hawking by the river,
With grey goshawk in hand, *

and with their train of falconers, in appropriate costume, and their well-broken dogs, and the silver music of the bells, mingled with a variety of other sounds, must have been a pleasant enough scene to behold, or to form part of

For most species of game, it appears that spaniels, cockers, or other dogs were required to rouse the birds to wing. When at a proper elevation, the hawk, being freed from his head-gear, was cast off from the sportsman's fist, with a loud whoop to encourage her. But here great science was required; and it was frequently made matter of anxious and breathless debate as to whether the far jettee or the jettee serré should be adopted. These terms, like many more employed in those days in hawking and hunting, were derived from the French. Jeter signifies to throw or cast off. The far jettee meant to cast off the hawk at a distance from the quarry it was to pursue; and the jettee serré to fly it as near to the bird, or as soon after the destined prey had taken wing, as possible. But many considerations were involved in these decisions:—the species of the quarry, the peculiar properties of the hawk on hand at the time,—the nature of the country—the force and direction of the wind, and numerous other circumstances, had to be duly pondered

When the hawk was cast off, it flew in the direction of the game, and endeavoured to surmount it, or get above it, in its flight To obtain this advantage, when herons and other birds strong on the wing were pursued, the hawk was obliged to have recourse to scaling, or ascending the air by performing a succession of small circles, each going higher and higher, like the steps of a winding cork-screw staircase In whatever way it was performed this was called "the mount." At times, both the pursuer and pursued would fly so high as almost to be lost in the clouds. When the hawk reached a proper elevation above the game, she shot down upon it with all her force and velocity, and this descent was technically called "the stoop," or "the swoop" John Shaw, Master of Arts, of Cambridge, who published a strange book called 'Speculum Mundi' (The World's Looking-glass), in that learned city, in 1635 informs us that the heron, or hernsaw, "is a large fowle that liveth about waters," and that hath a marvellous hatred to the hawk, which hatred is duly returned. "When they fight above in the air, they labour both especially for this one thing, that one may ascend and be above the other. Now if the hawk getteth the upper place, he overthroweth and vanquisheth the heron with a marvellous earnest flight It should seem, however, that this was not always the case, and that the heron sometimes received the hawk on its long sharp bill, and so transfixed and killed her. When the hawk closed or grappled with her prey (which was called binding in falconry), they generally tumbled down from the sky together, and the object of the sportsman was, either by running on foot or galloping his horse, to get to the spot as soon as they should touch the earth, in order to assist the hawk in her struggle with her prey.

We believe all birds of the Falcon genus naturally strike their prey with their talons, or claws, but in one of our engravings we see a hawk striking and binding a wild duck with her beak So correct a delineator as Reidinger was not likely to make a mistake, and indeed we see it mentioned in one of the books we have consulted that a hawk, well reclaimed and enlured, would kill the smaller game with her beak, or the strong percussion of her breast bone, and then hold or bind it with her beak (Fig 1245)

The Falcons, it should be observed, were taken into the field with hoods over their eyes, and with little bells on their legs, and the sportsman carried a lure, to which the bird had been taught to fly by being fed regularly upon or near it, with fresh-killed meat "When the hawk," says Master Gervase (1615) is "passingly reclaimed, you must bring her to lure by easy degrees, first by dainties, making her jump upon your fist, then to fall upon the lure, when held out to it, and then to come at the sound of your voice, and to delight her the more with the lure, have it ever garnished, on both sides, with warm and bloody meat"

These lures seem to have been of various sorts In very old times, a "tabur stycke,' which was merely a piece of wood rounded and besmeared with blood, was in use; but with the progress of civilization, a better lure, called a "hawker was introduced The hawker was a staff about twenty-two inches long, cased at the upper part with iron, having a bell "rather of sullen tone than musical," and the figure of a bird, with outstretched wings, carved at the top When this instrument was agitated, a reclaimed hawk would descend to it from the clouds, but we believe, for a bird of the highest training, nothing more was required than to shake the tasselled hood we see in the hand of the sportsman, Fig 1243, and to use the voice.

"Oh! for a falconer's voice, to lure this tassel gentle back again'

is put by Shakspere into the mouth of Juliet, and the same delineator of nature makes Hamlet exclaim, by way of answer to Horatio, in the language of the falconer calling in his hawk, "Illo, ho, ho, boy! come, bird, come!' It may interest some to hear, that in the twenty-seventh year of

---

* Chaucer

1341.—Going to the Fiel

1239.—Hawk on Fist

238.—Peregrine Falcon and Partridge.

1340.—Going to the Field

1247 – Kestrels

1249.—Head and Foot of Bengal Falcon

Hawking for Wild Ducks

1248.—Bengal Falcon

1246 Merlins

his reign, Henry VIII. issued a proclamation in order to preserve the partridges, pheasants, and herons, "from his palace at Westminster to St. Giles's-in-the-Fields, and from thence to Islington, Hampstead, Highgate, and Hornsey Park." Any person, of whatsoever rank, who should presume to kill or in anywise molest these birds, was to be thrown into prison, and visited by such other punishments as should seem meet to his highness the king.

It is worthy of remark that Henry VIII. removed the royal hawks (which had been kept there during many reigns) from the Mews at Charing Cross, and converted that place into stables. According to Stow, the king of England's falcons were kept at the Mews in Charing Cross as early as 1377, or the time of the unhappy Richard II. The term "Mews," in falconer's language, meant strictly a place where hawks were put at the moulting season, and where they cast their feathers. The name, confirmed by the usage of so long a period, remained to the building at Charing Cross, though Henry VIII. had so changed its destination as to make it inapplicable. But what, however, is much more curious is this,—that when in more modern times the people of London began to build ranges of stabling at the back of their streets and houses, they christened those places "Mews," after the old stabling at Charing Cross, which, as we have shown, was misnamed from the time the hawks were withdrawn from it. In accidental modes like this many an old word is turned from its original meaning, which eventually is altogether lost.

The old travellers Marco Polo and Father Rubruquis give graphic descriptions of hawking among the Mongol Tartars, during the thirteenth century, which sport was conducted in a style of barbaric magnificence. The Khan had, among other birds of prey, eagles trained to stoop at wolves, and such was their size and strength, that none, however large, could escape from their talons. Recent travellers in Central Asia make frequent mention of hawks and hawking. Mr. Johnson, in his 'Indian Field-Sports,' describes the sport as carried on by the princes and nobles of India. The late Sir John Malcolm, in his delightful little work called 'Sketches of Persia,' also gives some very animated descriptions of these sports. He frequently partook in them during his journeys and embassies to the court of the Shah. In speaking of his stay at Abusheher (a place on the Persian Gulf), he says,— "The huntsmen proceed to a large plain, or rather desert, near the sea-side; they have hawks and greyhounds; the hawks carried in the usual manner on the hand of the huntsman; the dogs led in a leash by a horseman, generally the same who carries the hawk. When an antelope is seen, they endeavour to get as near as possible; but the animal, the moment it observes them, goes off at a rate that seems swifter than the wind: the horsemen are instantly at full speed, having slipped the dogs. If it is a single deer, they at the same time fly the hawks: but if a herd, they wait till the dogs have fixed on a particular antelope. The hawks, skimming along near the ground, soon reach the deer, at whose head they pounce in succession, and sometimes with a violence that knocks it over. At all events they confuse the animal so much as to stop its speed in such a degree that the dogs can come up; and in an instant, men, horses, dogs, and hawks surround the unfortunate deer, against which their united efforts have been combined. The part of the chase that surprised me most was the extraordinary combination of the hawks and the dogs, which throughout seemed to look to each other for aid. This, I was told, was the result of long and skilful training.

"The antelope is supposed to be the fleetest quadruped on earth, and the rapidity of the first burst of the chase I have described is astonishing. The run seldom exceeds three or four miles, and often is not half so much. A fawn is an easy victory; the doe often runs a good chase; and the buck is seldom taken. The Arabs are indeed afraid to fly their hawks at a buck, as these fine birds, in pouncing, at times impale themselves on its sharp horns.

"The hawks used in this sport are of a species I have never seen in any other country. This breed, which is called Cherkh, is not large, but of great beauty and symmetry. * * *

"The novelty of these amusements interested me; and I was pleased, on accompanying a party to a village, about twenty miles from Abusheher, to see a species of hawking peculiar, I believe, to the sandy plains of Persia, on which the Hubara, a noble species of bustard, is found on almost bare plains, where it has no shelter but a small shrub called geetuck. When we went in quest of them, we were a party of about twenty, all well mounted. Two kinds of hawks are necessary for this sport; the first, the cherkh (the same which is flown at the antelope), attacks them on the ground, but will not follow them on the wing; for this reason, the Bhyree, a hawk well known in India, is flown the moment the hubara rises.

"As we rode along, in an extended line, the men who carried the cherkhs every now and then unhooded and held them up, that they might look over the plain. The first hubara we found afforded us a proof of the astonishing quickness of sight of one of the hawks; she fluttered to be loose, and the man who held her gave a whoop as he threw her off his hand, and then set off at full speed. We all did the same. At first we only saw our hawk skimming over the plain, but soon perceived, at the distance of more than a mile, the beautiful speckled hubara, with his head erect and wings outspread, running forward to meet his adversary. The cherkh made several unsuccessful pounces, which were either evaded or repelled by the beak or wings of the hubara, which at last found an opportunity of rising, when a bhyree was instantly flown, and the whole party were again at full gallop. We had a flight of more than a mile, when the hubara alighted and was killed by another cherkh, who attacked him on the ground. This bird weighed ten pounds. We killed several others, but were not always successful, having seen our hawks twice completely beaten during the two days that we followed this fine sport."

To those who wish to enter more fully into the mysteries of hawking, we recommend Turbevill among the old writers, and Sir John Sebright ('Observations on Hawking') as the best modern authority on the subject.

1246.—THE MERLIN

(*Falco Æsalon*). This small but beautiful and high-spirited falcon is a native of Europe, and breeds in our British Islands; Mr. Selby has found its nest frequently in the upland moors of Northumberland. Dr. Heysham mentions three instances that came to his knowledge of merlins' nests in Cumberland, where he says the bird remains all the year. It breeds in several parts of Wales, and, according to Mr. Eyton, on the mountain of Cader Idris. It is indigenous in Ireland, breeding on the mountains of Londonderry, Mourne (Down), Claggan (Antrim), Clonmel (Tipperary), Youghal (Cork), and other places. The nest is loosely made upon the ground among the heath. Larks, thrushes, fieldfares, and partridges constitute the prey of this species, which it strikes with great address. According to Mr. Thompson, it frequents the sea-shore in pursuit of dunlins (Tringa variabilis), which it has been seen to kill.

Merlins were formerly used in the field, and, as the author of the 'Book of Falconrie' says, they become "passing good hawkes and verie skilful; their property by nature is to kill thrushes, larks, and partridges. They flee with greater fierceness and more hotely than any other hawke of prey. They are of greater pleasure, and full of courage, but a man must make greater care, and take good heed to them, for they are such busie and unruely things with their beakes, as divers times they eate off their own feet and tallons very unnaturally, so as they die of it. And this is the reason and true cause, that seldom or never shall you see a mewed or entermewed merlyn. For that in the mew they do spoyle themselves, as I have before declared." Sir J. Sebright says that the merlin will take blackbirds and thrushes, and that he may be made to wait on—that is, hover near till the bird be pursued and started again; "and though a merlin will kill a partridge, they are not strong enough to be effective in the field." ('Observations on Hawking.')

From its habit of sitting on a bare stone, or portion of rock, on the mountain moorlands, this bird has acquired the name of Stone Falcon, Rochier and Faucon de roche of the French, and Steinfalke of the Germans. The general plumage of the young is brown; when fully adult, the back and wings are of a bluish-ash colour, each feather having a central dash of black; the under parts are rufous, with oblong blackish spots. Length of male eleven inches, of female twelve inches and a half. The female resembles the immature male in having a brown plumage. The eggs, four in number, are reddish-brown, mottled with a deeper tint.

1247.—THE KESTREL

(*Falco Tinnunculus*). This falcon, often called Windhover, Stannel, and Stonegall, is very common in our islands, and is spread over Europe, Asia, and Africa. This probably is the Κεγχρις of Aristotle, and the Tinnunculus of the Latins (Pliny 'Nat. Hist.,' x. 37). It is the Foutivento, Canibello, Tristunculo, Acertello Falchetto di Torre, Gheppio, and Gavinello of the modern Italians; Cercrelle, Quercerelle, Cresserelle, and Epervier des Alouettes, of the French; Turmfalke, Roethel-geyer, Mausefalke, Winewachl, Rittl-weyer, and Wannen-weher of the Germans; Kyrko-falk of the Swedes; and Cudyll côch of the ancient British.

The kestrel is a bird of considerable powers of flight, but, unlike the little merlin, seldom takes its prey in the air; unless, indeed, when it gives chase to insects, as the cockchafer, &c., for it is chiefly on mice, frogs, &c. that it feeds. Mr. Selby, indeed, says that bird-catchers have seen it making a dash at their decoy-birds, and that he has himself caught it in a trap baited with a bird; and Mr. Thompson ('Birds of Ireland,' 'Mag. Zool. and Botan.,' vol. ii. p. 57) says, that though it is generally pursued by swallows, he once saw it the pursuer. "On September 22, 1832, when walking with a friend in the garden at Wolfhill, near Belfast, a male kestrel in full pursuit of a swallow appeared in sight over the hedgerow, and continuing the chase with extreme ferocity, lost not the least way by the swallow's turnings, but kept within a foot of it all the time, at one moment passing within five or six yards of our heads. It is idle to conjecture how long the foray may have lasted before we witnessed it, but immediately on the kestrel's giving up the chase, the swallow, nothing daunted, became again, accompanied by many of its species, the pursuer and tormentor, and so continued till they all disappeared. The kestrel was probably forced to this chase by the particular annoyance of the swallows, they and the martins being more numerous this day at Wolfhill than they had been during the season." It is thus that the large white-headed eagle is teased by the little king-bird or tyrant flycatcher (Tyrannus intrepidus), and even forces him to retreat. The kestrel, as the same writer states, has been so far trained by Mr. W. Sinclaire as to attend and soar above him like the peregrine falcon, and fly at small birds let off from the hand.

This species is often seen high in the air, with outspread tail and winnowing pinions, suspended over one spot; its keen eye is surveying with careful scrutiny the ground below—not a mouse, nor a frog, nor a lark on her nest, escapes its glance; having fixed upon its victim, down it drops, clutches its prize, and flies rapidly to its usual haunt. The destruction of field-mice by the kestrel ought to recommend it to the farmer, especially as it attacks neither pigeons nor poultry; unfortunately it is often confounded by the ignorant with the fierce sparrow-hawk (indeed we have generally heard it so called), which will devastate the dovecote and pounce upon young chickens.

The kestrel generally usurps the nest of a crow or magpie in which to lay its eggs and rear its young. It breeds also on inland and marine cliffs, church towers, &c. We have many times seen it fly in and out of the fissures of the perpendicular limestone rocks of the Peak of Derbyshire, and about Buxton. The eggs are four in number, pale reddish brown, mottled with a darker tint. The colouring is as follows:—

Male.—Top of the head bluish grey; upper parts reddish brown, regularly sprinkled with angular black spots; lower parts white, slightly tinged with reddish and with oblong brown spots; tail ash-coloured, with a wide black band towards its extremity, and terminated with white; bill bluish; cere, space around the eyes, iris, and feet yellow. Length about fourteen inches.

Female.—Larger than the male; all the upper parts of a brighter reddish; lower parts yellowish rusty, with oblong black spot; tail reddish, with nine or ten narrow black bands, and with a large band of that colour near its extremity, which is terminated with reddish white.

The *Young* have the top of the head, the nape, and the mantle brown-rusty streaked with black; these streaks form the angle of the back; on the first quills are seven reddish and whitish spots; tail reddish, undulated with grey-ash and transversely striped as in the female: throat reddish white: at the opening of the bill a small black stripe which is prolonged on the upper part of the neck; the rest of the lower parts whitish-rusty with oblong black spots; iris brown; cere yellowish green.

1248.—THE BENGAL FALCON

(*Hierax cœrulescens*). Allap of the Javanese; Falco Bengalensis, Brisson. This beautiful little falcon is generically distinguished by the edge of the upper mandible being bidentate, and the tarsi scutellated anteriorly. (See Fig. 1249, the Head and Foot.) It is a native of Java, and also, as it is stated, of Bengal. Small as it is, for it does not exceed six and a half inches in length, it is nevertheless bold and active, and pursues prey equal to itself in size with great determination. Its general colour above is glossy bluish black; forehead, throat, breast, and a line continued from the bill over the eye down the sides of the neck, white with a ferruginous tint. Under parts ferruginous; plumes of thighs long and silky; wings reaching only half-way down the tail.

HAWKS.

Beak short, hooked from the base; wings short; fourth quill-feather the longest. Though the hawks differ in flight and their mode of attacking their prey from the falcons, they are equally daring and impetuous, and one in particular, the goshawk, was among the most valued of the falconer's birds; it was termed "falcon gentil," and was flown at pheasants, wild geese, and even hares. Instead of soaring after the manner of the true falcons, the short-winged hawks, as the falconer calls them, dart along with arrow-like impetuosity in pursuit of their prey, threading woods, glens, and ravines; they strike it obliquely, overtaking it by their swiftness, and clutching it in their talons, bear it of in triumph.

1250.—The Laughing Hawk

(*Dædalion cachinnans*). Head and Foot. In this genus the beak is short, the tarsi moderate, and reticulated anteriorly. This species, which is a native of South America, has obtained its specific name from its peculiar cry. It tenants the neighbourhood of lakes or sheets of water, and lives upon reptiles and fish. Its general plumage is white; the backs and wings, and the space round the eyes with a nuchal intervening band, being brown; head crested. It is the Nacagua of Azara.

1251.—The Sparrow-Hawk

(*Accipiter fringillarius*). Generic characters of Accipiter:—beak short; nostril suboval; tarsi elongated, smooth, anteriorly scutellated. (Fig. 1252, Head and Foot of Sparrow-hawk.)

The Sparrow-hawk is L'Epervier of the French; Falco palombino and Sparviere da fringuelli of the Italians; die Sperber of the Germans; Sparfhoek of the 'Fauna Suecica;' Falco Nisus of Linnæus; and Gwepia of the ancient British.

This species is notorious for its destructiveness and daring. It is spread throughout the whole of Europe, and is common in the wooded parts of our islands; and is well known as one of the terrors of the farm-yard. The female, which much exceeds the male in size, is fatal to partridges and pigeons. The sparrow-hawk flies low, skimming with great rapidity, and pounces on its prey with unerring aim; in the days of falconry it was accounted the best bird for landrails.

This hawk builds in trees and thorn bushes, making a shallow flat nest of twigs: occasionally it occupies the deserted nest of a crow, and in the Orkneys it breeds on the rocks and sea-cliffs. The eggs, five in number, are of a whitish tint, blotched at the larger end with reddish brown. In a nest examined by Mr. Selby were found a lapwing, two blackbirds, a thrush, and two green linnets, recently killed. No hawk is more pertinacious in the pursuit of its quarry than the sparrow-hawk; it has been known to follow its terrified prey through open windows, into rooms, barns, and churches, undeterred by the presence of man. The male measures about twelve inches in length. The upper parts are of a dark bluish ash-colour; the cheeks, throat, and chest rufous, which colour breaks into obscure bars as it proceeds to the under surface; beak blue-black, cere greenish yellow, tarsi yellow, and tail greyish brown, with three transverse dusky bands. The female is fifteen inches in length; the upper surface is of a browner tinge than in the males, and the throat and under parts are greyish white, the former having small longitudinal dashes, the latter regular transverse bars of reddish brown. The young differ very considerably in having the general plumage brown, the feathers at the back of the neck and the scapularies being blotched with white, and the under parts yellowish white, with irregular longitudinal dashes of brown. The nestlings are at first covered with snow-white down.

1253.—The Chanting Hawk

(*Accipiter musicus*); Falco musicus, Daudin. It is somewhat strange to find a song-bird among the feathered tyrants of the air, whose cries are in general wild, shrill, and discordant. The present species, however, is an exception, and stands pre-eminent and alone, the minstrel of its race. It is, as Cuvier says, "the only known bird of prey which sings agreeably." In size it equals a goshawk; its plumage is grey above, white barred with brown on the lower part of the back and on the under parts of the body. It is a native of Africa, and preys upon large birds, hares, and other animals; it builds in trees. According to Le Vaillant, it "utters its strain every morning and evening, and not uncommonly continues it the whole night; each strain is continued in a loud tone for more than a minute, and after a pause it begins anew. While it is singing, it is so regardless of its safety that any one may approach very near it; but at other times it is suspicious, and takes to flight on the slightest alarm." ('Oiseaux d'Afrique,' i. 120.)

1254.—The Goshawk

(*Astur palumbarius*). The genus Astur differs from Accipiter in the proportionate shortness of the tarsi. This beautiful and high-spirited hawk is the Autour and Atour of the French; Astore (Zinan) and Girifalco (Bonaparte); Sparviere da columbe and Sparviere Terzuolo of the Italians; Grosser gepfeilter Falck and Hunerhabicht of the Germans; Hebog Marthin of the ancient British.

The Goshawk is rare in the British Islands, but is more abundant in the forest districts of the Continent, inhabiting Denmark, Sweden, Russia, and Switzerland, France, and Germany. It extends also into Asia.

Mr. Yarrell says, "The few that are used for hawking are obtained from the Continent. Colonel Thornton, who kept them constantly in Yorkshire, procured some of his specimens from Scotland. Dr. Moore, in his catalogue of the birds of Devonshire, says that it is found occasionally in Dartmoor, but I can find no record of its appearance farther west in England, nor any notice of it in Ireland. A fine adult male was trapped by a gamekeeper in Suffolk, in March, 1843; and Mr. Doubleday, of Epping, has sent me word that he received a young bird from Norfolk in the spring of the same year. Mr. Selby mentions that he had never seen a recent specimen south of the Tweed, but states that it is known to breed in the forest of Rothiemurcus, and on the wooded banks of the Dee. Mr. Low says that this species is pretty frequent in Orkney; but as he speaks of it in connexion with sea-beaten rocks without shelter or woods, is there not reason to suspect that Mr. Low was mistaken, and that the birds he saw were peregrine falcons?—the more so as several recent visitors to these northern islands have observed peregrines, but no goshawks." ('British Birds.') Prince Bonaparte has noted the goshawk as not common in the neighbourhood of Rome.

The goshawk frequents the deep solitudes of forests, preying upon hares, squirrels, and the larger kinds of birds. It makes its nest in lofty trees, preferring, it is said, the fir, laying three bluish white eggs marked with reddish brown. The flight of this hawk is low and rapid, and it strikes its prey as it skims along, with terrible force; but should the quarry take to covert and there conceal itself, it ceases pursuit, and waits in patience on some perch commanding a view of the spot, till the game takes wing. In this way it will remain hour after hour on the watch: and an instance is on record of a trained goshawk which drove a pheasant to cover one evening, remaining stationary till ten the next morning, when, on the falconers finding her and taking her away, the poor pheasant, which all that time had not dared to stir, but had remained fixed to the place under the influence of terror, at once took wing and flew off.

A full-grown female goshawk can secure a hare with ease. With regard to using these birds, the late Mr. Hoy, who was experienced in their training, informed Mr. Bartlett that "their habits and mode of flight were much better suited to an enclosed district than those of the peregrine falcon. When used or taken into the field, the wing of a bird or the thin end of an ox-tail is generally held in the hand to engage their attention, which they are constantly biting and tearing without being able to satisfy their appetites, as that would render them unfit for work. They do not require to be hooded, but have bells attached to the legs for the purpose of giving notice of their situation when they alight (which would otherwise be difficult to ascertain), and a leathern strap by which they are held; it is also necessary to have spaniels to hunt up the birds, upon the appearance of which the hawk flies from the hand with incredible swiftness direct at the game, generally taking it at the first attempt; but should the hawk fail, it will perch on some elevated situation, and remain until the game is again started, and is rarely known to miss a second time. When the hawk has captured the game, he is rewarded with a small piece of meat or a pigeon's head to induce him to give up his prey. If the hawk be allowed to range at pleasure, by whistling it will return with a swiftness truly astonishing, and finding it cannot stop suddenly to settle without striking you with great force, it will glide past, form a circle round you, and alight with the greatest ease and the most gentle manner upon the hand." ('Mag. Nat. Hist.' 1839, p. 603.) These hawks, be it observed, never ascend in gyrations and make the swoop for which the peregrine falcon is so celebrated. The goshawk is distinguished both for beauty of colour and elegance of contour.

The female measures about twenty-four inches in length, the male nineteen or twenty. The beak is bluish black, the cere wax yellow, the irides bright yellow; the whole of the upper surface and tail-feathers dark greyish brown; in the females the colour inclines to clove brown, the upper surface of the tail-feathers barred with darker brown; the nape of the neck, throat, breast, belly, and thighs, nearly white, with spots, transverse bars, and undulating lines of dull black; under tail-coverts white; lore, cheeks, and ear-coverts, greyish brown, forming an elongated dark patch on the side of the head; the legs and toes yellow; the claws black.

North America produces a closely allied species, distinguished by a darker colour on the head, and a greater multitude of zigzag lines and dashes on the under parts. It was met with by Dr. Richardson in the Hudson's Bay territories, and is figured in his 'Fauna Boreali-Americana.'

1255.—The Bidentate Harpagus

(*Harpagus bidentatus*). Head and Foot. This bird, representing the genus Harpagus, is in all essentials a hawk, but with a double tooth on each side of the beak as in the genus Terax. It may be regarded as a link between the hawks and the falcons. It is a native of Brazil and Guiana, but of its habits we have no details; length about thirteen inches. Upper surface slate-colour: throat white; under parts red, undulated with yellowish: lower tail-coverts white; tail brownish, barred with dirty white.

Hawks and falcons often attack each other, and sometimes two of the same species fight. Audubon gives an animated account of the conflict which he witnessed between two red-tailed hawks of America respecting a hare which one had killed. Fig. 1256 illustrates the mode of their aërial contests.

KITES.

Beak moderate, compressed, rather hooked from the base; tail forked; wings long and ample; tarsi short.

The birds of this section are remarkable for the ease, grace, and buoyancy of their flight; they sweep through the air in wide circles, sailing on outspread wings, and often mount to such a height as to become nearly invisible. Their vast wings and broad-forked tail give them great advantage. Unlike the falcons, however, they do not make an impetuous swoop upon their victim, but skim it from the surface of the earth, or even water, and bear it away in their talons. Moles, reptiles, rats, mice, and young poultry are their habitual prey, but they do not refuse carrion; they have not the daring of the hawks and falcons.

1257.—The Kite, or Glead

(*Milvus Ictinus*). Milan Royal of the French, from Belon to Buffon; Pojana, Milvio, Nicchio, and Nibbio of the Italians; Rother Milan of the Germans; Glenta of Brunnich; Glada of the 'Fauna Suecica;' Kite, Fork-tailed Kite, Glead or Glede (Pennant says from the Saxon 'Glida') of the English; Barcud of the ancient British. In some of the counties of England it is called the Puttock, a name also sometimes bestowed provincially upon the common buzzard. In Essex it is called the Crotched-tailed Puddock.

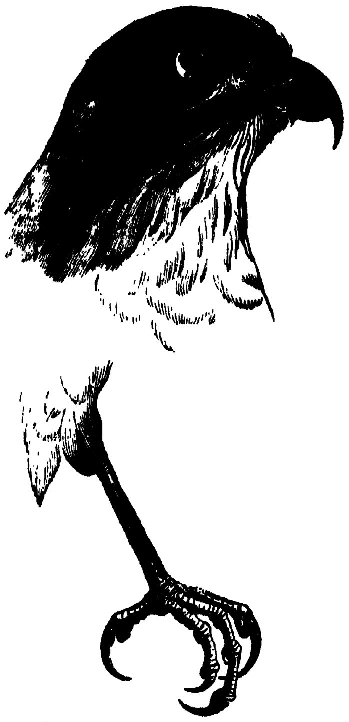
The Kite is distributed over the greatest part of Europe and Asia, and the northern districts of Africa. In our islands it appears to be less common than formerly: in Ireland it is not known. Formerly it was very abundant in the southern counties of England, and Clusius states that when he was in London an amazing number of kites flocked there for the offal thrown into the streets; they were so tame that they took their prey in the midst of crowds, and it was forbidden to kill them.

The kite, says Mr. Selby, "is proverbial for the ease and gracefulness of its flight, which consists of large sweeping circles performed with a motionless wing, or at least with a slight and almost imperceptible stroke of its pinions, and at very distant intervals. In this manner, and directing its course by the aid of the tail, which acts as a rudder, its slightest motion producing an effect, it frequently soars to such a height as to become almost invisible to the human eye." Its appearance, as it wheels over the farm-yard with eyes intent upon the broods of chickens and ducklings, is by no means hailed with pleasure, either by the feathered dependants of the farm or the good man who owns them. The poultry set up loud cries of execration, the hens call their broods beneath their wings, and chanticleer prepares for battle; the very dogs are roused, and the men run for their guns. Finding preparations made to receive him, the marauder generally makes off; but if he has swept away a chicken before the alarm is given, he is almost sure of repeating his visit, and is oftentimes so successful as to destroy a whole brood. Leverets, rabbits, young game, and small mammalia are also the prey of this species; it has been known to skim off dead fish and other floating animal substances from the surface of the water with the greatest address. The kite builds its nest in the forked branch of some tall forest-tree, and constructs it of sticks and twigs, lining it with wool, hair, and other soft materials. The eggs are three in number, rather larger than those of a hen; they are of a dirty white, with reddish brown spots at the large end. The female defends her nest vigorously.

The kite (male) is about twenty-six inches in

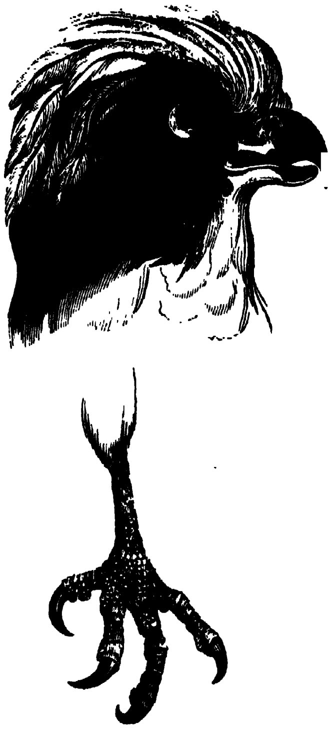
1254.—Goshawk.

1257.—Kite.

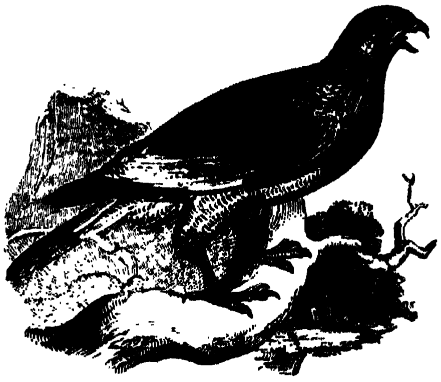


1252.—Head and Foot of Sparrow-Hawk.

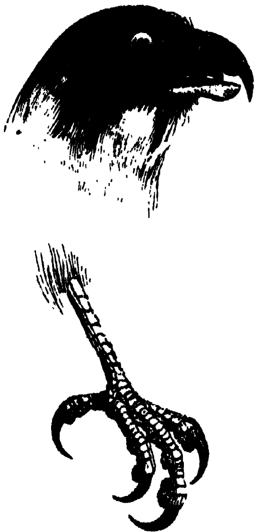
1256.—Hawks fighting.



0.—Head and Foot of Laughing Hawk.



1253.—Chanting Hawk.

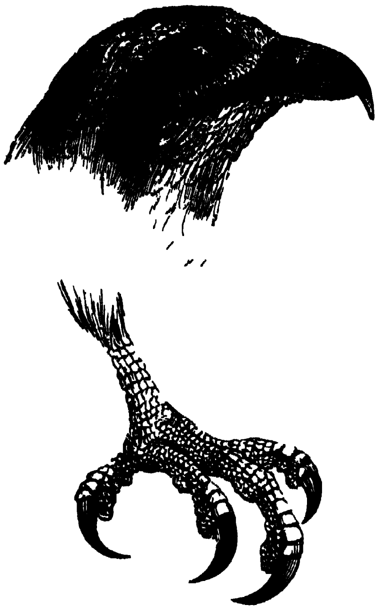


5.—Head and Foot of Bidentate Harpagus.

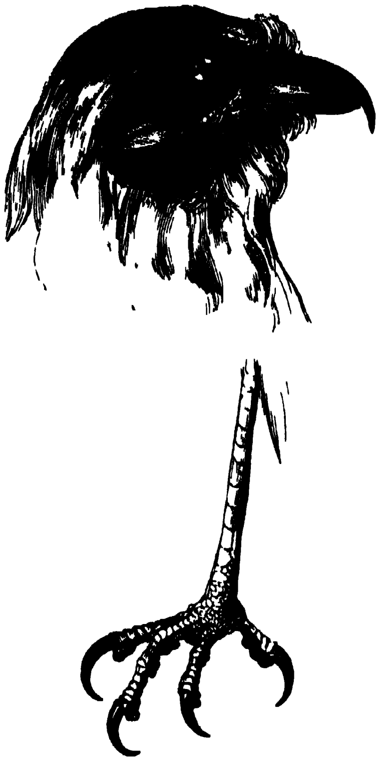
1251.—Sparrow-Hawk.

1 —Buzzard

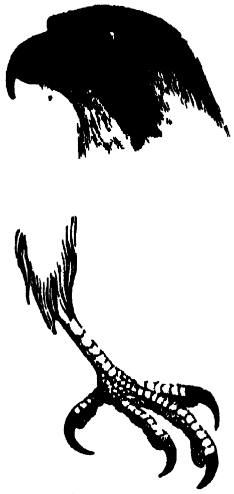
1959 —Black-winged Swallow-Hawk.



1962.—Honey Buzzard



1963 —Moor Harrier



1960.—Lead coloured Ictinia

1962.—Buzzard.

1964.—Swallow-tailed Hawk.

length; beak horn-colour; cere and irides yellow; feathers of the head and neck greyish white, streaked along the shaft with ash-brown; feathers of the back and wing-coverts dark brown in the centre, broadly edged with rufous; inner web of some of the tertials edged with white; primaries nearly black; upper tail-coverts rufous; tail-feathers reddish brown, the inner webs barred with dark brown; chin and throat greyish white, streaked with dusky; breast, belly, and thighs rufous brown, each feather with a central longitudinal streak of dark brown; under tail-coverts plain rufous white; tarsi and toes yellow; claws black. The females are larger than the males.

1258.—The Swallow-tailed Hawk

(*Nauclerus furcatus*). The extreme length of the wings and tail, and the strongly forked outline of the latter, characterize the genus Nauclerus.

This beautiful kite, remarkable for its grace and ease on the wing, is a native of North America; and is described very graphically both by Wilson and Audubon. According to the latter, only "a solitary individual of this species has once or twice been seen in Pennsylvania. Farther to the eastward the Swallow-tailed Hawk has never, I believe, been observed. Travelling southward along the Atlantic coast, we find it in Virginia, although in very small numbers. Beyond that state it becomes more abundant. Near the falls of the Ohio a pair had a nest and reared four young ones in 1820. In the lower parts of Kentucky it begins to become more numerous; but in the states farther to the south, and particularly in parts near the sea, it is abundant. In the large prairies of the Attacapas and Oppellousas it is extremely common. In the states of Louisiana and Mississippi, where these birds are abundant, they arrive in large companies in the beginning of April, and are heard uttering a sharp plaintive note. At this period I generally remarked that they came from the westward, and have counted upwards of an hundred in the space of an hour, passing over me in a direct easterly course. At that season and in the beginning of September, when they all retire from the United States, they are easily approached when they have alighted, being then apparently fatigued, and busily engaged in preparing themselves for continuing their journey, by dressing and oiling their feathers. At all other times, however, it is extremely difficult to get near them, as they are generally on wing through the day, and at night rest on the higher pines and cypresses bordering the river bluffs, the lakes, or the swamps of that district of country. They always feed on the wing. In calm and warm weather they soar to an immense height, pursuing the large insects called Musquito Hawks, and performing the most singular evolutions that can be conceived, using their tail with an elegance of motion peculiar to themselves. Their principal food, however, is large grasshoppers, grass-caterpillars, small snakes, lizards, and frogs. They sweep close over the fields, sometimes seeming to alight for a moment to secure a snake, and, holding it fast by the neck, carry it off, and devour it in the air. When searching for grasshoppers and caterpillars it is not difficult to approach them under cover of a fence or tree. When one is then killed and falls to the ground, the whole flock come over the dead bird, as if intent upon carrying it off. An excellent opportunity is thus afforded of shooting as many as may be wanted, and I have killed several of these hawks in this manner, firing as fast as I could load my gun. The swallow-tailed hawk pairs immediately after its arrival in the southern states; and as its courtships take place on the wing, its motions are then more beautiful than ever. The nest is usually placed on the top branches of the tallest oak or pine tree situated on the margin of a stream or pond. It resembles that of a carrion crow externally, being formed of dry sticks, intermixed with Spanish moss, and is lined with coarse grasses and a few feathers. The eggs are from four to six, of a greenish white colour, with a few irregular blotches of dark brown at the larger end. The male and female sit alternately, the one feeding the other. The young are at first covered with buff-coloured down. Their next covering exhibits the pure white and black of the old birds, but without any of the glossy purplish tints of the latter. The tail, which at first is but slightly forked, becomes more so in a few weeks, and at the approach of autumn exhibits little difference from that of the adult birds. The plumage is completed the first spring. Only one brood is raised in the season. The species leaves the United States in the beginning of September, moving off in flocks, which are formed immediately after the breeding season is over."

This species, according to Mr. Nuttall, will, like the Honey-Buzzard, prey upon locusts and wasps, and their larvæ, and make a regular attack on their nests. M. Vieillot states that it visits Peru and Buenos Ayres. Mr. Yarrell gives it a place among the British birds on the authority of two specimens, one killed at Balachoalist in Argyleshire in 1772, and another taken alive in Shaw-gill, near Hawes in Wensleydale, Yorkshire, in 1805. Apparently to avoid the violence of a tremendous thunderstorm, and the clamorous persecution of a flock of rooks which attacked it at the same instant, it took shelter in a thicket, where it was seized before it could extricate itself, on the 6th September. The person who caught it kept it a month; but a door being accidentally left open, it made its escape. It first alighted on a tree, at no great distance, from which it soon ascended in a spiral flight to a great elevation, and then went steadily off in a southerly direction as far as the eye could trace it. (Linn. Trans., vol. xiv.)

Bill bluish black; cere light blue; iris black; tarsi light greenish blue; claws flesh-coloured. The general plumage above is glossy black, with blue and purple reflexions; the head, the neck, and all the under parts are white tinged with bluish grey. Length two feet; the female is similar to the male.

1259.—The Black-winged Swallow-Hawk

(*Elanus melanopterus*). In this genus the tail is only slightly forked, and the tarsi are not only short, but semi-plumed.

The Black-winged Swallow-Hawk is Le Blac of Vaillant. It is common throughout the whole of Africa, from Egypt and Barbary to the Cape. It is found in Syria, and in some parts of India along the Ganges, and in the mountain chain of upper Hindostan. It is said to live principally upon insects, which it catches with great address while on the wing. Its size is that of the sparrow hawk; the plumage is silky; general colour above ash-grey; the shoulders black; under parts and greater part of tail white; bill black; tarsi yellow.

1260.—The Lead coloured Ictinia

(*Ictinia plumbea*). Head and Foot. There is some doubt as to the position of this genus; Vieillot, who founded it, regarded it as approaching the kites. Mr. Vigors referred it to the buzzards or harriers. An allied species (Falco Mississippiensis, Wilson) is regarded by its describer as a kite.

The Lead-coloured Ictinia is a native of America; its powers of wing are very great and it flies to an astonishing elevation, often remaining for a long time poised or stationary. It feeds much on the larger kinds of insects, and sweeps along rapidly in the chase. To these it adds reptiles and small quadrupeds. The back and wings are of a slate blue; the head and under parts whitish spotted with brown; iris fine red.

Wilson, speaking of its relative, the Mississippi Kite, states that it feeds on insects, and sails in the air with the turkey-vulture,—one looking out for carrion, the other for insects. "For several miles," he adds, "as I passed near Bayo Manchak, the trees were swarming with a kind of cicada, or locust, and here I observed numbers of this hawk sweeping about among the trees, like swallows, evidently in pursuit of these locusts; yet when we contemplate the beak and talons of this bird, both so sharp and powerful, it is difficult to believe that they were not intended by nature for some more formidable prey than beetles, locusts, and grasshoppers; and I doubt not but mice, lizards, snakes, and small birds furnish him with an occasional repast." "The long pointed wings and forked tail point out the affinity of this bird to that family or subdivision of the Falco genus distinguished by the name of Kites, which sail without flapping the wings, and eat from their talons as they glide along."

BUZZARDS.

In the Buzzards the beak is comparatively small; the tarsi generally short, sometimes feathered to the toes; the wings ample and rounded; the tail square; the body stout and robust. The flight is easy and undulating; they have neither the soar and swoop of the falcons, the arrow-like dash of the hawks, nor the circling sweep on motionless wings of the kite. They sail, however, easily and rapidly along, and hunt in quest of moles, rats, mice, young rabbits, reptiles, and insects.

1261, 1262.—The Buzzard

(*Buteo vulgaris*). This species is common in all the wooded countries of Europe and the adjacent parts of Asia. It is not rare in England, but more so in Scotland. In Ireland it is abundant. It occurs in the fur countries of North America. This bird is termed La Buse by the French; Falco Bottaone and Pagana by the Italians; Mause Falk and Wald Geyer by the Germans; and Bod teircaill by the ancient British. It is the Quidfogel of the 'Fauna Suecica.'

The buzzard has little of the daring impetuosity of the nobler birds of prey, though its strength and size are considerable. It is inactive in disposition, and is generally seen perched on the branch of a tree; whence, on perceiving its prey, it takes wing, gliding rapidly and silently on its victim. We have frequently observed it sailing with easy undulations over fallow-lands bordering woods, evidently in quest of food. Rabbits, hares, rats, reptiles, and small birds are its prey. Mr. Thompson found this species sailing about the basaltic precipices in the county of Londonderry, and obtained a pair of young from a nest previously occupied by ravens, on a ledge midway down a precipice, at Rosheen mountain, near Dunfanaghy. It breeds also on the range of inland rocks called Salagh Braes, and on another similar locality in Antrim; and also on the promontory of Fairhead in the same county. It builds on rocks also in Scotland. Generally speaking, however, the buzzard builds in tall trees, selecting the most retired part of the wood; often it appropriates the deserted nest of a crow. The eggs are three in number, larger than those of a hen, and of a greenish white slightly spotted with pale brown. It defends its young with great resolution, and as its strength is considerable, its homestead is not to be assailed with impunity. The young are very vociferous. The colour of the buzzard is subject to considerable variety, few individuals exactly coinciding in their markings. The upper parts are usually of a deep brown; the inferior, of a yellowish white, with brown or reddish stains and dashes; the tail is barred; the bill is lead-colour; the cere, tarsi, and iris yellow. Male twenty inches in length; female twenty-two.

Dr. Richardson ('Fauna Boreali-Americana') states that the common buzzard arrives in the fur countries in the middle of April, very soon afterwards begins to build its nest, and having reared its young departs about the end of September. It haunts the low alluvial points of land which stretch out under the high banks of a river, and may be observed for a long time motionless on the bough of a tree watching for some small quadruped, bird, or reptile to pass within its reach. As soon as it espies its prey, it glides silently into the air, and, sweeping easily but rapidly down, seizes it in its claws. When disturbed it makes a short circuit, and soon settles on another perch. One of Dr. Richardson's specimens had two middle-sized toads in its crop. It builds its nest on a tree, of short sticks, lining it with deer's hair. The eggs are, he says, from three to five in number, and he remarks that it was seen by the expedition as far north as the fifty-seventh parallel, and that it most probably has a still higher range. He gives a description of two: one, a male, shot on the 17th of June, at the nest, which contained three eggs, on the plains of the Saskatchewan; and another a female, killed at the nest also, near Carlton, May 22.

1263.—The Honey-Buzzard

(*Pernis apivorus*). Head and Foot. La Bondrée and Buse Bondrée of the French; Wespen-Busard of the Germans; Frosch-geyerl of Kramer; Slaghok of the 'Fauna Suecica;' Muse-Haeg and Muse-Baage of Brunnich; and Bod y mel of the ancient British.

Mr. Vigors observes that Pernis is distinguished by the singular character of the lorum that surrounds the eye being covered with feathers, instead of being naked, as in the other Falconidæ, or furnished only with hairs. In other respects, also, he states the genus differs from that of Buteo; the tarsi are reticulated anteriorly, and the third quill-feather the longest.

The Honey-Buzzard is very rare in England, but more common in the warmer countries of Europe, where it is migratory. It is found in Asia, and specimens have been received from various parts of India. We believe one instance only of its having been killed in Ireland is on record. The bird in question was shot by R. G. Bomford, Esq., in his demesne of Annandale, near Belfast. Mr. Thompson states that the bill and forehead were covered with cow-dung, from the search the bird had evidently been making for insects. The stomach contained some of the larvæ and fragments of coleoptera and various caterpillars. It is in fact chiefly upon caterpillars and the larvæ of bees and wasps that the honey-buzzard feeds, together with other insects, not however to the exclusion of moles, mice, rats, small birds, reptiles, and slugs.

According to Vieillot the honey-buzzard flies low, but runs on the ground with great celerity. It breeds in tall trees, making a nest of twigs with an inner layer of wool; the eggs are two or three in number, of an ashy grey, dotted at each end with small red spots, and surrounded in the middle with a broad blood-red zone, or mottled all over with two shades of orange-brown.

The honey-buzzard is a bird of passage, emigrating from Europe on the approach of winter; it is about the size of the common buzzard, but more slender: the top of the head is bluish ash-colour, the upper surface generally deep brown with a greyish tint; the secondary quill-feathers are barred alternately with dusky brown and grey; under surface whitish with triangular reddish bars or dashes; tail crossed by three bars of dark brown.

HARRIERS.

The Harriers may be distinguished from the buzzards by their long slender tarsi, their slight and more elongated contour of body, and their lengthened wings and tail. The plumage is of soft and loose texture, and the feathers round the face are so disposed as to form a sort of ruff, approaching to the disc so conspicuous in the owls. Beak small and compressed.

The harriers are more active and more on the wing than the buzzards; they frequent heathy moors, bogs, marshy wastes, and low flat grounds, over which they are continually flying; they quarter the ground like a spaniel, searching for snakes and other reptiles, small quadrupeds and birds; their flight is easy and buoyant, but seldom very elevated; they build on the ground, among reeds, fern, or rushes.

1264.—The Moor Harrier

(*Circus æruginosus*). Head and foot. Moor Buzzard, Marsh Buzzard of some writers; Harpaye, Busard Harpaye, and Busard de Marais of the French; Falco castagnolo and Falco con la testa bianca (young birds), Falco albanella con il collare (old), of the Italians; Schwarz-brauner, Fisch-Geyer mit dem gelben Kopf, Brauner rohr Geyer, Brandweihe, Wasserweihe, and Sumpfweihe of the Germans; Bod y gwerni of the ancient British.

This species is a native of most parts of Europe, Asia, and Africa; frequenting boggy moorlands and extensive marshes. It is common in Holland and in the Maremma of Italy, being in both countries migratory, as on the Continent generally, but not in our island.

The flight of the moor harrier is low, near the ground, and noiseless; on perceiving its prey it drops instantaneously upon it and secures it in its clutch. In this manner it surprises wild ducks, coots, dab-chicks, and water-rats; it preys to a great extent on frogs and will sometimes take perch or other fish as they swim on the surface of the water. It will also feed on dead carcasses. In Wales, where this bird is common, it preys upon rabbits that inhabit the sand-banks on the shores of Caermarthenshire, and Montagu saw nine together feeding upon the body of a dead sheep. This species builds its nest on the ground among tufts of grass or rushes which grow in marshy places. The eggs, three or four in number, are of a white colour, not spotted. The colouring of the adult bird is as follows:—head, neck, and breast pale dull yellowish, each feather having a central streak of brown; upper surface brown; quill feathers white at their origin, black the rest of their length; secondaries and tail-feathers ashy grey; under parts rufous, marked with yellowish dashes: beak black; cere greenish; tarsi yellow. Length, one foot eight or nine inches. During the first year the plumage is deep chocolate brown, the feathers having paler margins. From this stage the transition is gradual to the permanent livery, which is assumed the fourth year.

Family VULTURIDÆ (VULTURES).

Although the parallels which some distinguished naturalists in the present day have attempted to draw between mammalia and birds sometimes appear to be rather overstrained, there are some instances in which they are too palpable to be overlooked. The Falconidæ represent the lions, tigers, cats, and musteline groups; and in the present family, a foul-feeding race to whom the most loathsome carrion is acceptable, we may trace an analogy to the hyæna, jackal, and wild dog: alike scavengers of the earth, which they clear of putrescent animal remains, the noisome rejectanea, which would otherwise corrupt the air with pestilential exhalations, Providence has placed them in those countries where their services, disgusting as they are, are nevertheless essential. From the earliest times the wild dogs and the vultures have been notorious for their participation in the feast of carrion, the repast of the slain:

> " ——— πολλοὺς δὲ κύνες καὶ γῦπες ἔδονται
> Τρώων."—Homerus, *Iliad*, lib. xviii. line 271.

And again, Ovid—

> " Unguibus et rostro tardus trahet illa vultur,
> Et scindent avidæ perfida corda canes."

Vultures are, however, less ferocious in their disposition than wild dogs or hyænas, and seldom attack living prey; where the dead are, there are they gathered together: sailing on wide and ample wings, they sweep from the higher regions of the air to their repast, and gorge themselves until scarcely able to rise from the ground.

In these birds the beak, hooked at the point, varies in strength and form. In the more typical species the head and neck are denuded of feathers or only covered with a little down, while round the bottom of the latter is a ruff of soft or slender feathers, arising from a loose fold of skin, within which they can withdraw the neck and even the greatest part of the head, while they remain in a semi-torpid state, motionless as statues, during the digestion of their meal. (See Fig. 1265, Head of Griffon-Vulture.)

On the breast and over the crop the skin is bare, or at most scantily covered; the limbs are of moderate strength, but the toes are feeble, and unarmed with formidable talons; and they seldom attempt to remove their carrion food, but continue with it till satisfied. The plumage generally consists of stiff large feathers overlying each other, and forming an almost shot-proof defence. The wings are ample. It has been a matter of much discussion as to whether it is by their extraordinary powers of vision, or by the keenness of their scent, that vultures detect their food. It has been frequently noticed, that when the sky seems clear, when not a wing can be seen in the glowing expanse above, no sooner does an animal fall, no sooner has the hunter slain and left his quarry, than, as if suddenly called into existence, multitudes of vultures are observed pouring from the sky and thronging to the feast,

The ancient classic writers teem with passages attributing to the vulture an acute and discriminating scent:

> " nare sagaci
> Aëra non sanum, motumque cadavere sentit."
> Lucan.

> " . . . Per auras . . longè ducuntur odore volturii cadaveribus."
> Lucretius.

And Pliny, speaking of the senses, says, "Ex sensibus ante cætera homini tactus; deinde gustatus; reliquis superatur à multis, aquilæ clariùs cernunt, vultures sagaciùs odorantur." With the experience of the ancients agree the experiments of Mr. Waterton, while Mr. Audubon as strenuously maintains that it is on sight alone that the vulture depends, and such appears to be the opinion of Le Vaillant. "Desirous," says this naturalist, "of observing how so great a number of vultures could congregate together in so short a time, I concealed myself one day in a thicket, after having killed a large gazelle, which I left upon the spot. In an instant a number of ravens made their appearance, fluttering about the animal, and loudly croaking. In less than a quarter of an hour these birds were reinforced by the arrival of kites and buzzards; and immediately afterwards I perceived, on raising my head, a flight of birds at a prodigious height, wheeling round and round in their descent. These I soon recognised to be vultures, which seemed, if I may so express myself, to escape from a cavern in the sky. They seemed almost to precipitate themselves from the clouds to share the spoil, but my presence caused them speedily to disappear. Thus then it is that the vultures are called upon to participate their prey: the first carnivorous birds that discover a carcass rouse the others which happen to be in the environs by their cries and actions. If the nearest vulture does not spy his prey from the lofty region of the air in which he swims by means of his wide-spread wings, he perceives at least the subaltern and more terrestrial birds of prey preparing to take possession of it: but perhaps he himself has sufficient power of vision to enable him to discover it; he descends hastily and with a wheeling flight, and his fall directs the other vultures who witness his evolutions, and who have, no doubt, their instinct sharpened with regard to everything that concerns their food." Notwithstanding this, and various experiments by Mr. Audubon, we by no means concur in the attempted deduction that the vulture is destitute of the powers of smell. Professor Owen, in his account of the dissection of the olfactory organs of the turkey-buzzard, thus concludes: "The above notes show that the vulture has a well-developed organ of smell, but whether he finds his prey by that sense alone, or in what degree it assists, anatomy is not so well calculated to explain as experiment." ('Zool. Proceeds.' 1837, p. 35.)

Professor Owen's details are appended to the following observations on the habits of the turkey-buzzard, called John Crow in Jamaica, where a fine of five pounds is imposed upon those who destroy the bird within a stated distance of the principal towns. The writer is Mr. W. Sells: "It has," he says, "been questioned whether the vulture discovers its food by means of the organ of smell or that of sight. I apprehend that its powers of vision are very considerable, and of most important use to the bird in that point of view; but that it is principally from highly organized olfactories that it so speedily receives intelligence of where the savoury morsel is to be found, will plainly appear by the following facts. In hot climates the burial of the dead commonly takes place in about twenty-four hours after death, and that necessarily, so rapidly does decomposition take place. On one occasion I had to make a post-mortem examination of a body within twenty hours after death, in a mill-house, completely concealed, and while so engaged the roof of the mill-house was quickly studded with these birds. Another instance was that of an old patient and much-valued friend who died at midnight; the family had to send for necessaries for the funeral to Spanish Town, distant thirty miles, so that the interment could not take place till noon next day, or thirty-six hours after his decease, long before which time, and a most painful sight it was, the ridge of the shingled roof of his house, a large mansion of but one floor, had a number of these melancholy-looking heralds of death perched thereon, besides many more which had settled on trees in its immediate vicinity. In these cases the birds must have been directed by smell alone, as sight was totally out of the question."

In opposition to the above opinion, it has been stated by Mr. Audubon that vultures and other birds of prey possess the sense of smell in a very inferior degree to carnivorous quadrupeds; and that, so far from guiding them to their prey from a distance, it affords them no indication of its presence even when close at hand. In confirmation of this opinion he relates that he stuffed a skin of a deer full of hay and placed it in a field, and that in a few minutes a vulture lighted near it, and directly proceeded to attack it; but finding no eatable food at length quitted it. He further relates that a dead dog was concealed in a narrow ravine, twenty feet beneath the surface of the ground around it, and filled with briars and high canes; that many vultures were seen sailing in all directions over the spot, but that none discovered it. I may remark upon the above experiments that the deer was doubtless seen by the birds, but it does not follow that they might not also have smelt the hide, though inodorous to the human nose; in the second case, the birds had undoubtedly been attracted by the smell, however embarrassed they might have been by the concealment of the object which caused it. I have in many hundred instances seen the vulture feeding upon small objects under rocks and bushes, and in other situations, where it was utterly impossible that the bird could have discovered it but through the sense of smell; and we are to recollect that the habit of the vulture is that of soaring aloft in the air, and not that of foraging upon the ground.

The inference we have drawn from experiments, anatomy, and analogy, is, that both the eye and the olfactory organs of the vulture (and we may add the crow, the raven, &c.) aid this bird in its pursuit of food. We generally find every sense in due degree subservient to the necessities, habits, and appointed work of animals; hence, where *odour* is a prevailing characteristic of food, that the organs of the animal intended to devour that food should be insensible to it, seems an anomaly.

1266, 1267, 1268.—The Egyptian Vulture

(*Neophron Percnopterus*). Vautour Ourigourap of Vaillant; Rachamah, or Pharaoh's Chicken, of Bruce and others; Avoltoio aquilina and Caporaccajo of the Italians; Maltese Vultur, Latham. This species is found in Spain, Portugal, Malta, Turkey, and in the Archipelago; abundant in Africa, Arabia, Persia, and Southern Russia. In October, 1825, one of these birds, gorged with food, was shot near Kilve, near Somersetshire, and is now in the possession of the Rev. A. Matthew, of that place; and another of the same species was seen, but escaped. The utility of these birds in Egypt and other parts of the East, in clearing the streets of filth of every description, a task which they undertake in common with the pariah dogs, has been often alluded to by travellers Nor were the services of this vulture less valued in ancient than in modern times: it was among the number of the sacred animals of Egypt, and is often accurately represented on their monuments. Hence the appellation of Pharaoh's Chicken. A constant attendant on the caravan as it pursues its way from town to town; an assiduous frequenter of the shambles; an industrious searcher for carrion, it merits, at least as far as public utility is concerned, the regards of the community; nor are its services overlooked if not reverenced in the present day as a deity, it is still protected as a benefactor. In the neighbourhood of Gibraltar, and in the south of Spain generally, flocks of this vulture are annually seen: most probably they winter in Africa, but of this we have no decided information. Captain S. E. Cook says that he saw them, near Seville, following the track of the plough, like rooks, in order to devour the grubs in the upturned soil.

The long and ample wings of the Egyptian vulture give it amazing powers of flight, and enable it to soar with great buoyancy. Like the rest of the family, however, when gorged to repletion with its foul diet, it becomes so sluggish and unwieldy as scarcely to be able to raise itself from the ground

1270.—*a*, Turkey-Buzzard; *b*, Black Vulture.

1268.—Egyptian Vultures.

1272.—Griffon Vulture.

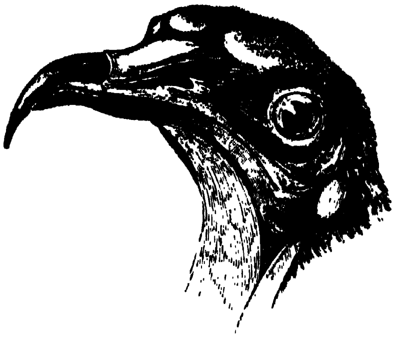
1266.—Egyptian Vultures.

1267.—Egyptian Vultures.

1273.—Griffon Vulture.

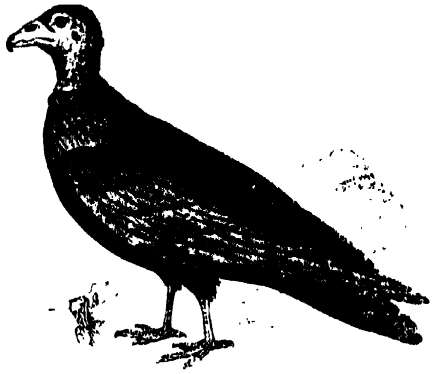
1274.—Griffon Vult

· Vulture.



1269.—Head of Egyptian Vulture

1265.—Head of Griffon-Vulture.



1271.—Turkey-Buzzard

1270.—Pondicherry Vulture.

1275.—Cinereous Vulture

1276.—Cinereous Vulture.

and indeed in this state may be easily captured; not that the task would be very pleasant, so strong and disgusting is the effluvium which it emits.

Bruce considers this bird to be the Rachamah of Scripture (see the Appendix to his 'Travels'), such being the name by which it is now known in Egypt. In size the Egyptian vulture somewhat exceeds a raven, its length being two feet five or six inches, and the expanse of its wings about five feet eight or nine inches. When in complete plumage, it is of a uniform white, with the exception of the greater quill-feathers, which are black. The forehead, cheeks, and throat are naked, the skin being of a livid yellow. The eyes are dark. The bill is slender and straight, abruptly hooked at the tip. This state of plumage is acquired by successive changes, the first livery being umber-brown, which is gradually exchanged, at each moult, for lighter and lighter tints, till the purity of the white is complete. It breeds in the clefts of rocks and on elevated places; its eggs are stated to be three or four in number and of a white colour. Fig. 1269 represents the Head of this species.

1270 (*a*), 1271.—The Turkey-Buzzard

(*Cathartes aura*). This species is spread through South America and the southern section of the United States. It is common in Jamaica and other West India islands.

According to Wilson, the Turkey-Buzzard is gregarious, roosting in flocks on the limbs of large trees; rows of them may be seen on a summer morning spreading out their wings to the rising sun, and remaining in that posture for a considerable time. They are, he adds, often seen in companies soaring at an immense height, particularly previous to a thunder-storm. His observations allude to this bird as observed by him in New Jersey. Mr. Darwin, on the contrary, states that "the turkey-buzzard is a solitary bird, or at most goes in pairs. It may at once be recognised from a long distance by its lofty soaring and most elegant flight. It is well known to be a true carrion feeder. On the west coast of Patagonia, among the thickly-wooded islets and broken land, it lives exclusively on what the sea throws up, and on the carcasses of dead seals; and wherever these animals are congregated on the rocks, there the vultures may be seen." Mr. Waterton observes that though flocks collect as to a common feast, still he does not consider the turkey-buzzard to be gregarious, properly speaking—that is, they do not form a colony, like rooks, but each pair pursues its separate interests. We suspect that this applies to most other vultures, which congregate round the grand object of attraction—their putrid banquet.

The turkey-buzzard breeds in May, in the deep recesses of the solitary swamps of New Jersey, as Wilson informs us, the female making no nest, but laying her eggs in the hollow of some decayed stump of a tree or log; the eggs are three or four in number, of a dull white, blotched, especially at the larger end, with chocolate brown and dashes of black. The male often watches while the female is sitting, and, if not disturbed, the same pair will occupy the same breeding-place for many years in succession. The young are at first clothed with whitish down. Both young and old, if molested, disgorge the offensive contents of their stomachs, so that it is not safe to attempt to touch them.

The turkey-vulture is two feet and a half in length. The bill is light horn-colour; the nostrils are wide slits; the eyes are dark; the head and neck, for about an inch below the ears, are naked, the skin being reddish, wrinkled, and beset with short hairs, but the neck is not so much carunculated as that of the black vulture. From the back of the head to the neck-feathers the space is covered with down of a sooty-black colour; the fore part of the neck to the crop is bare. The general colour of the plumage is glossy brownish black, with green reflexions; bill elongated, feeble, and curved only at the point.

1270 (*b*).—The Black Vulture, or Gallinazo

(*Cathartes atratus*). The Gallinazo inhabits South America and the warmer parts of the northern division of that continent; and in South Carolina, Savannah, Georgia, &c., may be seen in numbers sauntering about the streets or sunning itself on the tops of houses; multitudes may be often observed in the fields congregated round the carcass of any dead animal, and blackening the ground like a flock of rooks: they keep up a continual hissing while engaged in their feast, from which it is not easy to drive them, having become confident from long and universal tolerance.

Wilson says that the black vultures are indolent in their habits, loitering for hours together in one place. They do not associate with the turkey-buzzard, from which they differ not only in their much darker colour and other details, but also in flight They rise flapping their wings, and then sail with them extended nearly horizontally; while the turkey-buzzard seldom flaps its wings—and when sailing they form an angle with the body upwards. The black vulture on the ground hops along very awkwardly; but the turkey-buzzard moves with an even gait: the latter, unless pressed by hunger, will not eat of a carcass until it becomes putrid; the former is not so fastidious, but will devour animal food without distinction.

According to Mr. Darwin, the gallinazo has a different range in South America from the turkey-buzzard, "as it never occurs to the southward of lat. 41°. Azara states that there existed a tradition that these birds at the time of the conquest were not to be found at Monte Video, but that they subsequently followed the inhabitants from the more northern districts. At the present day they are numerous in the valley of the Colorado, which is three hundred miles due south of Monte Video. It seems probable that this additional migration has happened since the time of Azara. The gallinazo generally prefers a humid climate, or rather the neighbourhood of fresh water: hence it is extremely abundant in Brazil and La Plata, while it is never found on the desert and arid plains of Northern Patagonia, excepting near some stream. These birds frequent the whole Pampas to the foot of the Cordillera, but I never saw or heard of one in Chile: in Peru they are preserved as scavengers. These vultures certainly may be called gregarious, for they seem to have pleasure in society, and are not solely brought together by the attraction of a common prey. On a fine day a flock may often be observed at a great height, each bird wheeling round and round without closing its wings, in the most graceful evolutions. This is clearly done for sport-sake, or perhaps is connected with their matrimonial alliances."

The gallinazo builds its nest in the large trees of the low swamps. The length of this bird is twenty-six inches. The head and part of the neck are covered with a black, wrinkled, carunculated skin, beset with short black hairs, and downy behind; the nostrils are oblong slits. The general colour is dull black, except the primaries, which are whitish on the inner vane, with a cream-white bar on the outer vane of the first four.

1272, 1273, 1274.—The Griffon-Vulture

(*Vultur fulvus*). This large species, which may be regarded as an example of the more typical forms of this group of birds, is a native of Silesia, the Tyrol, Dalmatia, Spain, the Pyrenees and Alps, Turkey, the Grecian Archipelago, Arabia, Syria, Persia, and Africa. It is Le Griffon of the French; Weisköpfiger Geier of the Germans; Avoltoio di color costagno of the Italians.

Like all its tribe, the Griffon feeds upon dead carcasses, to which it is attracted in considerable numbers, and when once it has made a lodgment upon its prey it rarely quits the banquet while a morsel of flesh remains; so that it may be sometimes seen perched upon the putrescent mass for several successive days. It never attempts to carry off any portion in its claws, not even to satisfy its young, but feeds them by disgorging the half-digested morsel from its maw—the ordinary manner indeed in which the vultures rear their young, and which is very different from that of the eagles, falcons, hawks, &c., who bring living or yet reeking prey to their nest, and tear it up for their brood.

Occasionally this vulture attacks sickly animals incapable of defending themselves: but this is only when no other mode of satisfying its appetite presents. After gorging itself to repletion, the griffon assumes an unchanged attitude, and patiently waits till the process of digestion is complete: if disturbed, it is incapable of flight, until it has freed its maw from the oppressive load.

The powers of wing possessed by the griffon are very great, and it often soars to such a pitch as to become invisible to human sight. In captivity it is apathetic, or at least is only roused to animation by the calls of hunger; and having feasted, it resumes its listless composure. Head and neck covered with close white down; lower part of the neck surrounded by a ruff of long, slender, white feathers; a space on the middle of the breast is covered with white down. General colour fulvous or yellowish brown, verging towards buff; quill and tail feathers blackish brown: length upwards of four feet; female larger than the male. The general plumage of the young is yellow variegated with markings of grey, and the down of the neck is more or less brown. Fig. 1265 is the Head of this species.

1275, 1276.—The Cinereous Vulture

(*Vultur cinereus*). Gyps cinereus, Savigny; Vautour arrian and Vautour noir of the French; Grauer Geier of the Germans. This species is a native of the forests of Hungary, the south of Spain, Sardinia, Sicily, Western Asia, Egypt, and India. In its habits, though the beak is stouter, and the claws more curved than in most vultures (the sociable and Pondicherry vultures resembling it in these particulars), the Cinereous Vulture agrees with the rest of its race. Temminck states that its food consists of carrion, but never of living animals, towards which it manifests fear. Bechstein, on the contrary, states that in the winter this vulture descends from the mountain-ranges into the plains, where it attacks not only hares, goats, and sheep, but even deer. The farmers are said to suffer severely from its depredations, for it will frequently pick out the eyes of a sheep; but, as it is not shy, often pays the penalty of its life to the watchful hunter, who is well paid for shooting the marauder.

Back of the head and neck denuded of feathers; the skin of a bluish cast; on the rest of the neck a yellow down; sides of the neck furnished with curled feathers, and an ample tuft of long loose feathers at the insertion of the wings; general colour chocolate-brown; tarsi half-plumed. Length near four feet; female rather larger.

1277.—The Sociable Vulture

(*Vultur auricularis*). Oricou of Le Vaillant, T'Ghaip of the Hottentots. This noble bird, a native of South Africa, is said by Le Vaillant to be gregarious in its habits, numbers associating together in building their nests in the fissures of craggy rocks, two or three nests being sometimes in the same fissure or cavern, side by side, and others in adjacent crevices: hence the title of Sociable, a title which Dr. A. Smith considers to be founded on error. He has never met with more than one nest actually occupied on the same tree (not fissure of a rock). The mistake has probably originated in a new nest being occasionally built adjoining to an old one which had been deserted on account of its having become unserviceable. The bird, he adds, seems but little disposed to sociability; more than two are rarely seen together, and if four occur in the neighbourhood of a carcass, the number is considered as great; while of the griffon-vulture it is by no means uncommon to see a hundred or even more congregated where carrion exists. Head and neck red and naked; folds of skin originating behind the ears and passing down the sides of the neck; ruff of feathers at the lower part of the neck black; general plumage blackish brown; feathers of the under parts long and narrow, covering a fine white down. Length nearly four feet; expanse of wings ten feet.

1278.—The Pondicherry Vulture

(*Vultur Ponticerranus*). This species, which offers nothing differing from its race in habits and food, is found abundantly in various parts of India, as Bengal, &c. Colonel Sykes met with it in the Dukhun. It is solitary, more than two being seldom if ever seen together. The top of the skull is remarkably broad and flat; a fold of skin, arising below the ears, runs down each side of the neck, which is flesh-coloured and naked, a few scattered hairs being dispersed over it; ruff at the base of the neck composed of short rounded feathers. Crop covered with down; plumage generally blackish brown. Length thirty-six inches.

1279.—The Chinese Vulture

(*Vultur leuconotus*). A beautiful specimen of this vulture is now living in the gardens of the Zool. Soc. It equals a turkey in size: the general colour is brownish black; lower part of the back, under side of wings, and inner side of thighs white; when the wings are closed, the white of the back is not seen. Head brownish black, with short black hairs; back of the neck covered with whitish down; the front of it bare and of a livid flesh colour; ruff at the base of the neck dirty white; white feathers from each side lap over the crop; cere blackish; bill horn-colour; iris dark. In aspect and manners this species is similar to the rest of its race; and in captivity is quiet and contented.

1280.—Kolbe's Vulture

(*Vultur Kolbii*). This species is generally dispersed through Africa and India; it occasionally visits Sardinia. In South Africa it is very numerous. Dr. A. Smith, speaking of Kolbe's Vulture, the Vultur auricularis, and another species, the Vultur occipitalis, says, "The three foregoing birds feed exclusively on carrion. The Vultur Kolbii, though not the most powerful, is by far the most courageous species, and while it is feeding neither of the others will venture to approach its prey. Its numbers, moreover, are very great as compared with those of the two other species, hundreds of them appearing wherever there is carrion to attract them. So numerous are they, indeed, that when an ox, a horse, or other large quadruped lies dead, they assemble in hundreds, and in a few hours the whole of the carcass is consumed. At such a time many of these rapacious birds may be observed so exceedingly gorged, as to be quite unable to fly; when they may be beaten to death with sticks: but their assailants run the hazard of being severely wounded with the strong beaks of the birds, which even in this state will defend themselves with the greatest vigour."

Kolbe's vulture is closely allied to the griffon-vulture, which it closely resembles in colouring, but is less in size. In Kolbe's vulture the feathers of the wings of the lower parts are all rounded at the end: in the griffon-vulture they are long and pointed In Kolbe's vulture the ruff is neither so long nor so abundant as in the griffon; the plumage of the adult is nearly of a whitish Isabella colour, while that of the adult griffon is of a uniform bright brown throughout.

1281.—The Indian Vulture

(*Vultur Indicus*). This vulture is common throughout the whole of India. It is a voracious bird, and may be seen lingering on the sea-shore, preying on dead fish, and the putrescent exuviæ of the waters, left by the waves on the beach Flocks follow armies, and multitudes assemble on the battle-field, for "where the slain are, there are they."

Head and neck destitute of feathers all the upper plumage yellowish ash-colour, varied with brown and greyish white, under parts yellow; breast covered with close down of a brown tint, bill black lighter at the point, naked skin of the head rusty ash. Length forty-two inches Colonel Sykes says these birds "congregate in flocks of twenty or thirty. On a dead camel or horse or bullock being thrown out on the plain, numbers of these vultures are found assembled round it in an incredibly short time, though they may not have been seen in the neighbourhood for weeks before."

1282, 1283, 1284 —The Condor

(*Sarcoramphus Gryphus*) The exaggerated accounts of the earlier writers and naturalists, who painted this bird as rivalling the Rukh of Oriental fable, have given place to the moderate details of sober minded observers, and we no longer look upon this vulture as the winged guardian of mountain-mines, within whose depths were entombed "gems and barbaric gold," the freightage of a thousand royal argosies, treasures

> 'which far
> Outshone the wealth of Ormus and of Ind

We no longer imagine it the giant of the winged race, dimming the light of the sun by its wide-spread pinions, or, by their mighty rushing as it sweeps down from some lofty pinnacle or the upper regions of the sky, deafening and stupifying the terror-stricken beholders

To the scrutiny of the Baron Von Humboldt and of M Bonpland we owe the reduction of the bird to its proper dimensions Nestling in the most solitary places, often upon the ridges of rocks, which border the lower limit of perpetual snow, and crowned with its extraordinary comb, the condor for a long time appeared to the eyes of Humboldt himself as a winged giant, and he avows that it was only the measurement of the dead bird that dissipated this optical illusion The grand scenery amid which it is found had a precisely contrary effect on Lieutenant Maw,[*] who in describing his descent into the deep and narrow valley of Magdalena, says "whilst descending, several condors hovered round us, and about the rocks on which they build their nests but so vast was the scale of the rocks and mountains that even these immense birds appeared quite insignificant, and I doubted for a time that they were condors"

The condor, a native of the Andes of South America, is an example of the genus Sarcoramphus, characterized by the fleshy carbuncles or comb-like appendages at the base of the beak and the forehead, and the nakedness of the neck, and the size and oval form of the nostrils, placed on the anterior edge of the cere the third quill-feather is the longest. This genus is peculiar to the New World, and contains, besides the condor, the King vulture and the Californian vulture.

The elevation chosen by the condor as its breeding-place and habitual residence varies from ten thousand feet to fifteen thousand above the level of the sea, and here, on some isolated pinnacle or jutting ledge, it rears its brood and looks down upon the plains below for food. It is generally seen singly or in pairs—seldom in large companies, though among the basaltic cliffs of the St Cruz Mr. Darwin found a spot where scores usually haunt. "On coming," he says, "to the brow of the precipice, it was a fine sight to see between twenty and thirty of these great birds start heavily from their resting places, and wheel away in majestic circles." It appears that many clusters of rocks or high precipitous crags are named after these birds; the appellations, in the language of the Incas, meaning the "Condor's look-out," the "Condor's roost," the "Condor's nest," &c.

High over the loftiest pinnacles may the condor often be seen soaring, borne up on outspread wings, describing in its flight the most graceful spires and circles. "Except when rising from the ground," says Mr. Darwin, "I do not recollect ever having seen one of these birds flap its wings. Near Lima I watched several for nearly half an hour without once taking off my eyes They moved in large curves, sweeping in circles, descending and ascending without once flapping. As they glided close over my head, I intently watched from an oblique position the outlines of the separate and terminal feathers of the wing, if there had been the least vibratory movement, these would have blended together, but they were seen distinct against the blue sky The head and neck were moved frequently, and apparently with force, and it appeared as if the extended wings formed the fulcrum on which the movements of the neck, body, and tail acted If the bird wished to descend the wings were for a moment collapsed, and then, when again expanded with an altered inclination, the momentum gained by the rapid descent seemed to urge the bird upwards with the even and steady movement of a paper kite In case of any bird soaring, its motion must be sufficiently rapid so that the action of the inclined surface of its body on the atmosphere may counterbalance its gravity The force to keep up the momentum of a body moving in a horizontal plane in that fluid (in which there is so little friction) cannot be great, and this force is all that is wanted The movement of the neck and body of the condor we must suppose sufficient for this However this may be, it is truly wonderful and beautiful to see so great a bird hour after hour, without any apparent exertion, wheeling and gliding over mountain and river"

The condor feeds, like other vultures, on carrion, dead llamas, mules, sheep, &c When gorged with food they sit sullen and drowsy on the rocks and, as Humboldt says, will suffer themselves to be driven before the hunters rather than take wing, but he adds that he has seen them when on the look-out for prey, especially on serene days, soaring at a prodigious height, as if for the purpose of commanding the most extensive view The same writer states that he never heard of any well authenticated instance of these birds commencing an attack on man, or of their carrying away children (according to vague report), that he often approached within a few feet of them as they sat on the rocks, but they never manifested any disposition to assault him and the Indians at Quito assured him that men have nothing to fear from them This scarcely applies to other animals "Besides feeding on carrion" says Mr Darwin, "the condors will frequently attack young goats and lambs Hence the shepherd dogs are trained, the moment the enemy passes over, to run out, and, looking upwards, to bark violently" Two of them will sometimes attack the vicugna, the llama, the heifer and even the puma, persecuting the quadruped till it falls beneath the wounds inflicted by the beaks of its assailants The condor is indeed amazingly strong, and extremely tenacious of life Sir Francis relates the account of a struggle between one of his Cornish miners and a condor gorged with food, and therefore not in the best state for the fray the man began by grasping the bird round the neck, which he tried to break, but the bird, roused by the unceremonious attack, struggled so violently as to defeat the plan nor after an hour's struggling, though the miner brought away several of the wing-feathers in token of victory, does it appear that the bird was despatched!

According to Mr Darwin (and Humboldt states the same), "the condor makes no sort of nest, but in the month of November and December lays two large white eggs on a shelf of bare rock On the Patagonian coast I could not see any sort of nest among the cliffs where the young were standing It is said the young condors cannot fly for an entire year At Concepcion, on the fifth of March (corresponding to our September), I saw a young bird, which, though in size little inferior to an old one, was completely covered with down like that of a gosling but of a blackish colour After the period when the young condors can fly and apparently as well as the old birds, they yet remain at night on the same ledge and hunting by day with their parents. Before, however, the young bird has the ruff turned white, it may be often seen hunting by itself" Mr Darwin considers it probable that the condor breeds only once in two years

At the age of two years the condor is not yet black, but of a yellowish brown, and up to this time the female has no appearance of a ruff hence, ignorant of the change in the plumage of this bird, many travellers talk of two species of condor.

The feathers of the condor are so close and firm, and overlap each other so regularly, as to throw off a bullet, unless it hits point blank. The general colour of the adult male is glossy black, with a tinge of grey. The greater wing-coverts, except at the base and tips, and the secondary quill-feathers, are white; and a white ruff of downy feathers encircles the base of the neck. This part, as well as the head, is bare, the skin being coarse and wrinkled, and of a dull reddish colour, with a tinge of purple A large firm comb surmounts the forehead, and the skin at the back of the head folds into irregular wrinkles, converging into a sort of loose wattle beneath the bill, which, as in the turkey, is capable of being dilated at pleasure. The tail is broad and somewhat wedge-shaped Length about four feet; expanse of wing about nine feet; tarsi powerful The female wants the comb, and the greater wing-coverts are blackish grey

The condor is captured by the lasso, or taken in various traps and stratagems. According to Mr Darwin, the Chilenos are in the habit of marking the trees in which they roost, frequently to the number of five or six together, and then at night climb up and noose them They are such heavy sleepers, he adds, as I myself witnessed, that this is not a difficult task Lieutenant Maw saw the condor's quill used as a pen in the Cordillera (Toulea).

1285, 1286 —The King-Vulture

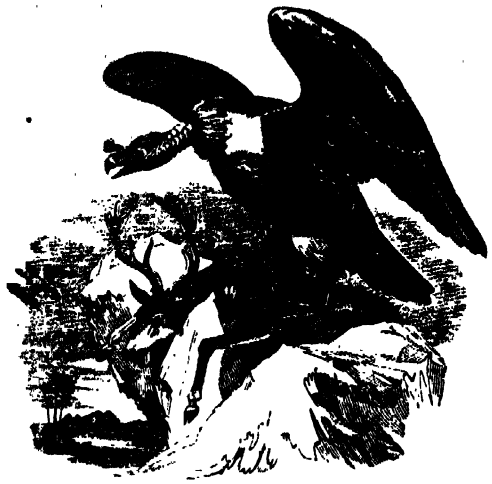
(*Sarcoramphus Papa*). This beautiful species is a native of the intertropical regions of America, and is seen occasionally in Florida, probably its most northern limit It is not, like the condor, a mountain bird, but tenants the low humid forests bordering rivers and savannahs, where animal life is abundant, and where decomposition rapidly succeeds death It is amidst the most luxuriant scenery that this monarch of the vultures reigns, the turkey-buzzard and gallinazo being in subjection under him Waterton in his amusing work relates, that while sailing up Essequibo, he observed a pair of king vultures sitting on the naked branch of a tree, with about a dozen of the common species, waiting to begin the feast upon a goat, killed by a jaguar, but which he had been forced to abandon. The pair seemed rather to tolerate the presence of the rest, than to associate with them on terms of familiarity The same traveller, having killed a large serpent, caused it to be carried into the forest as a lure for one of these vultures which he wished to obtain He watched the result "The foliage," he says, "where he laid the snake was impervious to the sun's rays, and had any vultures passed over that part of the forest, I think I may say with safety, that they would not have seen the body through the shade For the first two days not a vulture made its appearance at the spot, though I could see a Vulture aura gliding on apparently immovable pinions at a moderate height over the tops of the forest trees But during the afternoon of the same day, when the carcass of the serpent had got into a state of putrefaction, more than twenty of the common vultures came and perched upon the neighbouring trees, and the next morning, a little before six o'clock, I saw a magnificent King of the Vultures There was a stupendous mora tree close by, whose topmost branches had either been dried by time or blasted by the thunder storm Upon this branch I killed the King of the Vultures before it had descended to partake of the savoury food which had attracted it to the place Soon after this another King of the Vultures came, and after he had stuffed himself almost to suffocation, the rest pounced down upon the remains of the serpent, and stayed there till they had devoured the last morsel."

Though this species is mostly seen alone or in pairs, travellers state that in Mexico it is sometimes observed in flocks. The general account, that the other vultures stand patiently by till their monarch has finished his repast, and which appears to be not without foundation, may be easily accounted for by the superior strength and courage of this species

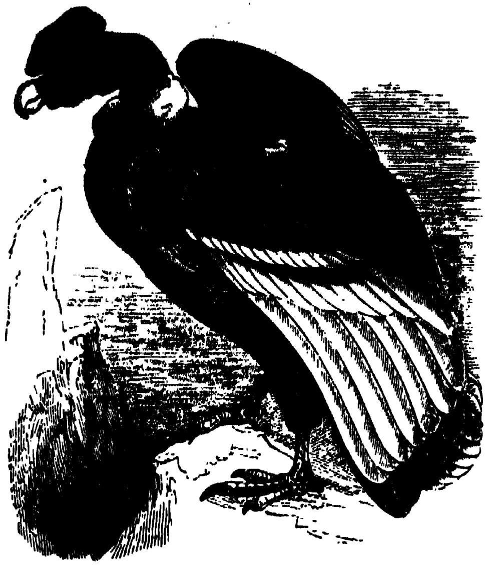
The colours of the king-vulture are very splendid. The naked skin of the head and neck is deeply tinged with mingled scarlet orange, and violet beneath the eye are several deep wrinkles converging to a fold of skin extending obliquely downwards along the neck Over the cere of the beak hangs a loose comb of bright orange, the circle round the eyes is scarlet, in singular contrast with the pearl white of the iris the ruff round the bottom of the neck is soft, downy and of a delicate grey The general plumage is of a bright fawn-colour, the quill-feathers, the greater coverts, and tail-feathers glossy black Length about two feet and a half, expanse of wings upwards of five feet The young birds of the year have a dull bluish plumage, and a violet head and neck, in the second year their plumage is dusky, marked with longitudinal white spots in the third year the permanent colouring is nearly assumed, and is completed on the subsequent change of feathers.

---

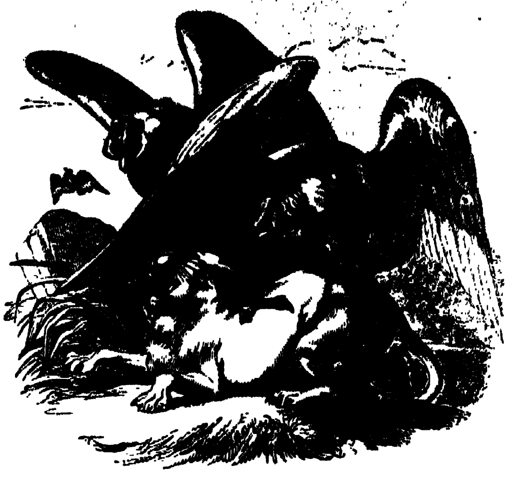
[*] 'Journal of a Passage from the Pacific to the Atlantic' by H. L. Maw, Lieut. R. N



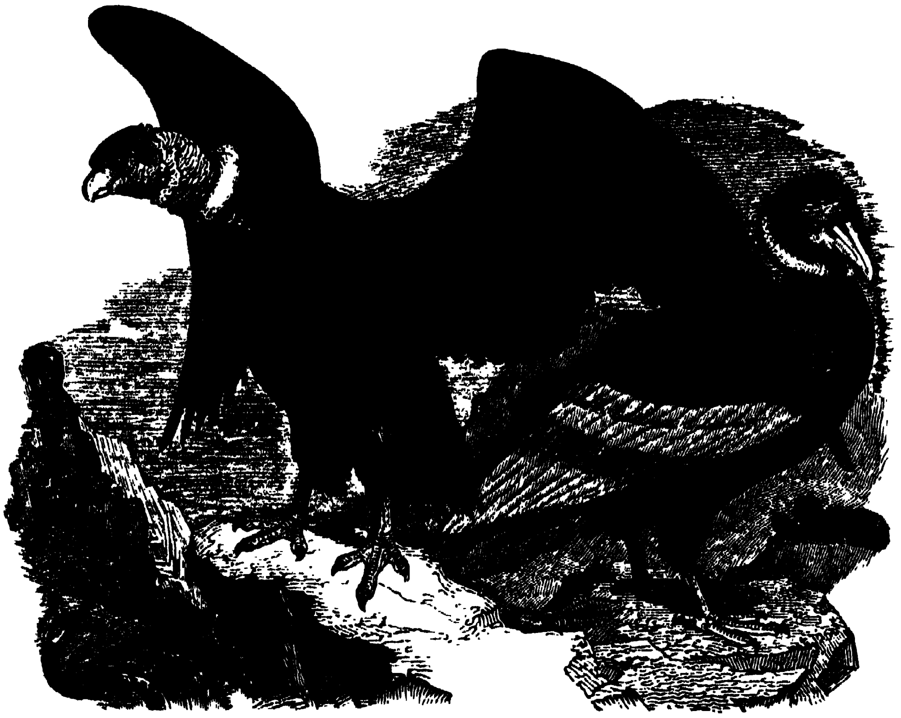
1286.—King Vulture.



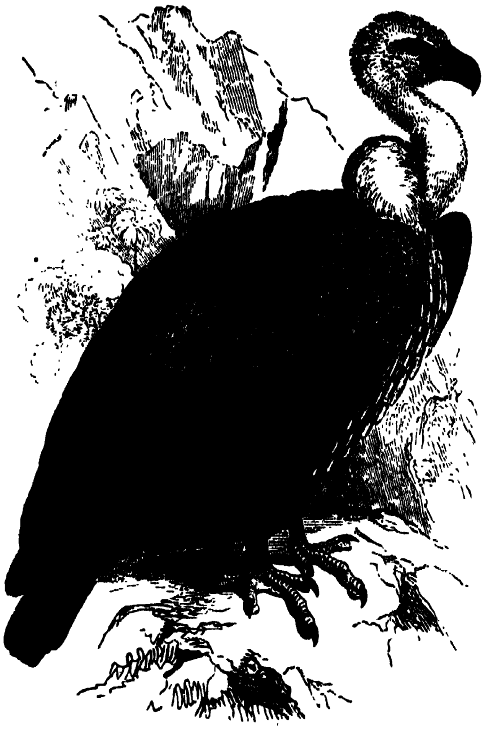
1282.—Condor



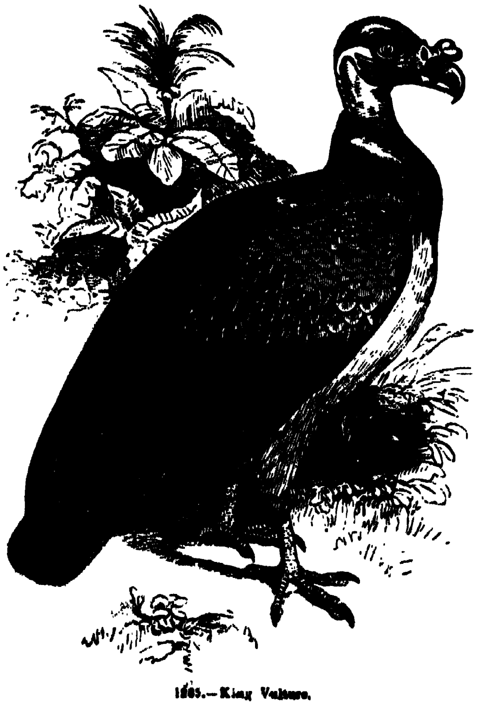
1284.—Condors.



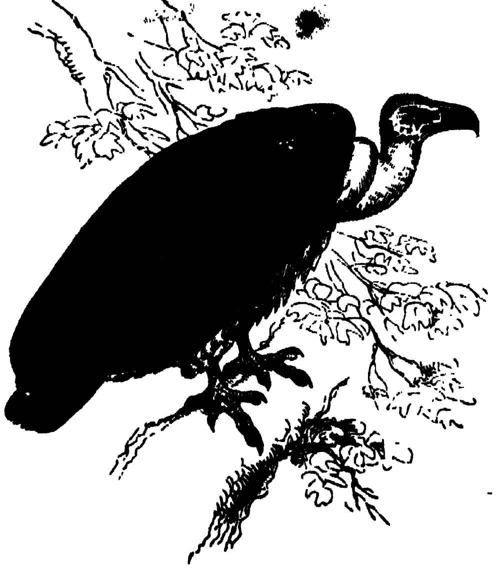
1283.—Condors.



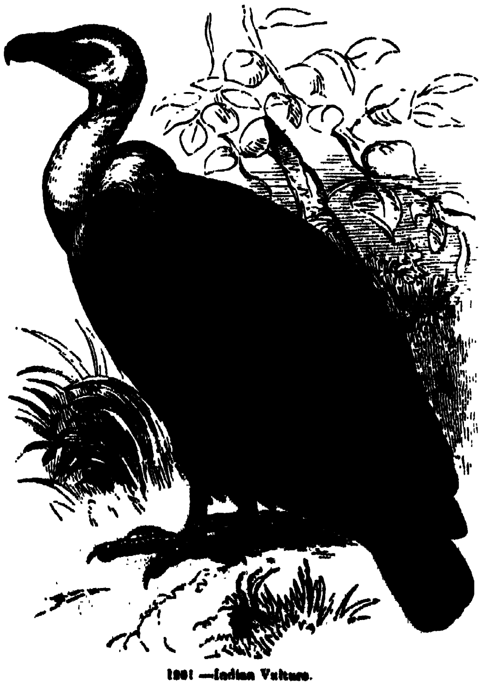
1280.—Kolbe's Vulture



1285.—King Vulture.

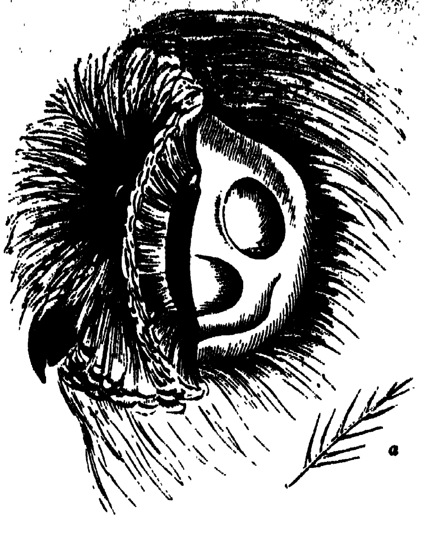


1279.—Chinese Vulture

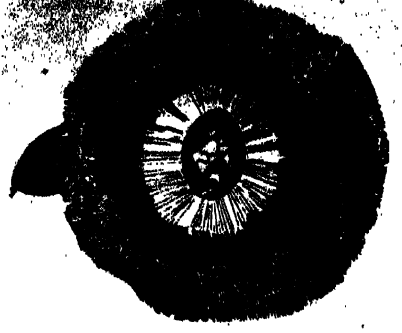


1281.—Indian Vulture.

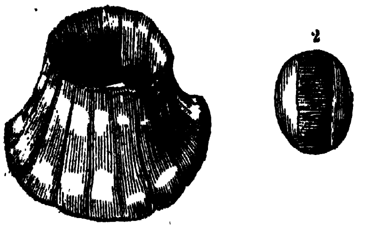
1294.—Head of young Barn Owl.



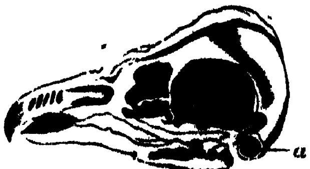
1290. External Ear of Owl.



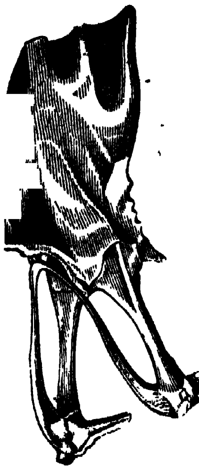
1293.—External Ear of Owl.



1291.—Bony Ring and Lens of Snowy Owl.



1296.—Skull of Horned Owl.

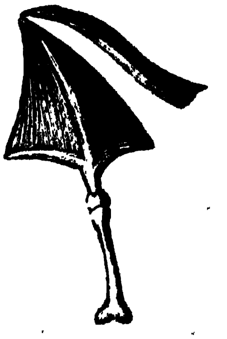


1295.—Breast-bone of Wood-Ow.

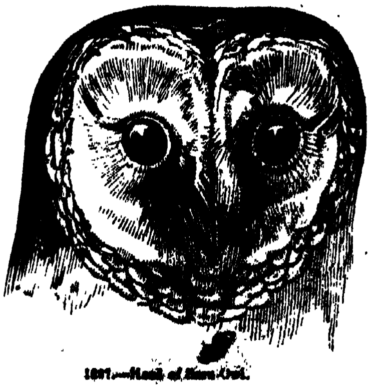
1297.—Barn-Owl.

1289.—Foot of Barn-Owl.

[illegible].—Mask of [illegible] Owl.



1292.—Drum of Ear in Birds.



1287.—Mask of Barn-Owl.

Family STRIGIDÆ (OWLS).

The birds of this family have large heads, and great projecting eyes directed forwards, and surrounded by a circle or disc, more or less developed, formed of loose and delicate feathers, the margin consisting of feathers of a firmer texture and more definite outline. The beak is hooked and raptorial; the claws are curved, sharp, and retractile; and the outer toe is versatile, in order to strengthen the grasp. The plumage is full and soft, generally spotted, barred, and clouded with different shades of tawny, brown, and yellow. Many species have the top of the head garnished with elongated plumelets, or tufts, capable of being erected or depressed; they rise from the margin of the disc over each eye, and are commonly, but of course erroneously, called ears or horns See Fig. 1287, the Head of the Common Barn Owl, exhibiting the facial disc, Fig 1288, Head of the Horned Owl, showing the tufts, Fig. 1289, the Foot of the Barn-Owl. In Fig 1290, *a* represents one of the Feathers of Disc, magnified

The owls, some few excepted, are crepuscular and nocturnal in their habits, they come forth with the dusk of evening to prowl for food, they winnow the air with silent pinions, their ears attentive to every slight sound, and their eyes quick to discern their creeping prey, on which they glide with noiseless celerity.

The organic endowments of these nightly marauders are in admirable concordance with their destined mode of life Let us look at the common barn-owl as a type of the family The eyes, we observe, are large and staring, but they are incapable of bearing the strong light of day, the iris is irritable, and the pupil almost completely contracted, the lids are half closed, and the membrana nictitans almost constantly drawn over the ball, like a delicate curtain, but when twilight sets in, the eyes display a very different appearance—the lids are wide open, the curtain is folded back, the pupil is widely dilated, and they gleam with lustrous effulgence. In all British birds, and, we believe, as a general rule, the bony ring of the eyeball is convex externally; but in the owls it is concave, and lengthened—the transparent cornea being placed, as it were, at the end of a tube, the whole resembling the glass used by watchmakers Fig 1291 represents, 1, the bony ring of the Snowy Owl: 2, the crystalline lens of the same bird, *a*, the anterior surface, less convex than the posterior one. The facial disc of feathers materially aids vision by concentrating the rays of light Mr Yarrell observes that the extent of vision enjoyed by the falcons is probably superior to that of the owls, but that the more spherical lens and corresponding cornea give to the eyes of the latter an intensity better suited to the opacity of the medium in which their power is required to be exercised They may be compared to the eyes of "a person near-sighted, who sees objects with superior magnitude and brilliancy when within the prescribed limits of his natural powers of vision from the increased angle these objects subtend "

We have previously said that birds have no external ears, but in the owls, whose sense of hearing is exquisite, and who listen for their prey, we find an exception to the general line If we part the feathers forming the back part of the rim of the disc, we shall find the large auditory orifice enclosed between two valves of thin skin, from the edges of which proceed the feathers in question The leaves of this double valve are capable of being thrown wide apart, so as to concentrate as well as admit every slight vibration, the effect of which is increased by the widely-diffused cavities connected with the internal chambers The drum of the ear is very thin and transparent, and its vibrations are conveyed to those winding hollows called the labyrinth, by a single *ossiculum*, as in reptiles In order to distend, support, or relax the drum, there is a cartilaginous organ stretching from the side of the passage almost to the middle of the membrane, while there is another cartilage divided into three branches, of which the middle one being the longest, is joined to the top of the cartilaginous organ before mentioned (see Fig. 1292), and assists in bearing up the external membrane (the drum). The cartilage joins the top of the *ossiculum* or *columella*, which is a very fine, light, bony tube, the bottom of which expands into a plate, fitting into the *foramen ovale* (the entrance to the labyrinth), to which it is braced all round by very slender muscles. Figs. 1290 and 1293 represent the external Ear of the Owl; Fig. 1294, the Head of a young Barn-Owl. The head is so turned as to expose the auditory passage and valvular *ossiculum* *a*, the cranium; *b*, the nostril on the beak; *c*, the neck; *d*, the eye; *e*, the termination of the external skin surrounding the orifice of the ear; *f*, the anterior flap or opercular fold of the ear; *g*, part of the tympanic or quadrate bone; *h*, *membrana tympani*, or drum of the ear.

From the loose texture of their soft full plumage, and from the laxity of the quill-feathers (of which the outer edges are fringed by a pectinated line of delicate lashes, the terminations of the barbs), the flight of the owl, though buoyant and easy, is by no means distinguished for velocity, like that of the falcon, the wings gently fan the air; they present no rigid edges, they do not cut it with the whistling stroke of the pinions of the hawk or dove; no rustling sound is heard as the owl skims lightly by; and in accordance with this condition of the plumage and feathers of the wing, is the development of the sternum and its appendages. Variation of course exists in different species, but the keel (see Fig. 1295) is less deep and projects less forward than in the falcon, the furcula is less arched, more slender and more distinctly triangular, and the coracoid or clavicular bones are less robust and straighter; the whole is less solid and expansive. Fig. 1296 represents the skull of the Strix otus, showing the orbit, and, below it, *a*, the large auditory orifice

The owls prey on living animals the larger species on hares, rabbits, birds, &c., the smaller on mice, moles, rats, and reptiles.

1297, 1298 —THE BARN-OWL

(*Strix flammea*) This is the Effraie, Fresaie, and Petit Chathuant Plombé of the French, Barbagianni, Allocco Commune e Bianco, of the Italians, Schleierkauz, Perlschleierkautz, and Perl-Eule of the German, De Kerkuil of the Netherlands, Barn-Owl, White Owl, Church-Owl, Gillihowlet, Howlet, Madge Howlet, Madge Owl, Hissing Owl, and Screech Owl of the modern British, and Dylluan wen of the ancient British

This beautiful bird is spread throughout the temperate and warmer regions of Europe It is common in England and Ireland, but less so in Scotland, in the high northern latitudes of the Continent it is not known. The barn-owl conceals itself during the day in deep recesses among ivy-clad ruins, in antique church-towers, in the hollow of old trees, in barn-lofts, and similar places of seclusion At night it sallies forth for prey, which consists of mice, rats, moles, and shrews, but, we believe, never birds Hence it is persecuted by the farmer in vain, who suspects that it thins his dovecot and little knows the extent of the services which the bird renders to him. "It," says Mr Waterton, "this useful bird caught its food by day, instead of hunting for it by night, mankind would have ocular demonstration of its utility in thinning the country of mice, and it would be protected and encouraged everywhere When it has young it will bring a mouse to the nest every 12 or 15 minutes"(that is during the night), and he adds, "formerly I could get very few young pigeons till the rats were excluded from the dovecot, since that took place it has produced a great abundance every year, though the barn owl frequents it and is encouraged all round it," and he affirms that the pigeons neither regard it "as a bad or suspicious character "

Mr Thompson ('Mag Zool and Botan.,' vol ii p 178), observes that "the white (barn) owl is a well-known visitor to the dovecot,- and in such a place, or rather a loft appropriated to pigeons, in the town of Belfast, I am informed by an observant friend, that a pair once had their nest, this contained four young, which were brought up at the same time with many pigeons The nests containing the latter were on every side, but the owls never attempted to molest either the parents or their young As may be conjectured, the owl's nest was frequently inspected during the progress of the young birds, on the shelf beside them never less than six, and often 15 mice and young rats (no birds were ever seen) have been observed, and this was the number they had left after the night's repast The parent owls, when undisturbed, remained all day in the pigeon-loft" In further proof, it may be urged, that the remains of rats, mice, and occasionally beetles, have been found, to the exclusion of feathers, in the stomachs of most owls when examined Such remains were found in the stomachs of all those opened by Mr Thompson and of such are the pellets cast by the owls invariably composed.* The owl quarters the ground for food with great regularity, and drops upon it with unerring aim. Selby says it occasionally utters loud screams during its flight; and Mr Yarrell says it screeches but does not generally hoot. But Sir Wm Jardine asserts that he shot one in the act of hooting, and that at night, when not alarmed, hooting is its general cry. It snores and hisses, and when annoyed snaps its bill loudly.

The barn-owl constructs a rude nest; the eggs are three or four in number, and of a white colour, and, strange to say, the female often lays a second time before the young are able to leave the nest—hence young owls have been found late in the autumn, and even in December. Mr. Blyth, in the 'Field-Naturalist's Magazine' (vol. i.), says, "A nest of the barn-owl in this neighbourhood (Tooting) contained two eggs; and when these were hatched two more were laid, which were probably hatched by the warmth of the young birds; a third laying took place after the latter were hatched: and the nest at last contained six young owls, of three different ages, which were all reared."

The plumage of the barn-owl is very beautiful, the upper parts are bright yellowish, varied with grey and brown zigzag lines, and sprinkled with a multitude of small whitish dots; face and throat white, lower parts in some individuals rusty white, sprinkled with small brown dots, in others bright white, marked with small brownish points; in others again, without the slightest appearance of spots, feet and toes covered with very short down; iris yellow. Length about thirteen inches; no horn-like tufts.

In the female all the tints are brighter. The young are covered with a thick white down, and remain long in the nest.

1299 —THE URAL OWL

(*Surnia Uralensis*) Strix Uralensis, Pallas; Le Chouette des Monts Urals, Sonnini; Die Ural Habichtseule, Bechstein.

This rare species is a native of the arctic regions of the Old World, Lapland, the north of Sweden, Norway, Russia, Hungary, and Japan. It is occasionally seen in Germany.

In the Ural owl the tail is long, and far exceeds the tips of the folded wings, the tarsi are rather short and robust Leverets, rats, mice, grouse, ptarmigans, and other birds, are the prey of this species It constructs its nest in the hollows of decayed trees, often it is said, near the dwellings of man, the eggs are three or four in number, and of a pure white The head of this owl is of considerable size, the facial disc large, and of a greyish white marked with some blackish hairs, the marginal circle of the disc is composed of white feathers spotted with brownish black Top of the head, nape, back, and wing-coverts, marked with great longitudinal spots disposed on a whitish ground; all the under parts whitish, marked in the middle of each feather with a large longitudinal stripe of brown. Quill and tail feathers banded with brown and white alternately, seven bands on the tail. Beak yellow, nearly hidden in the long hairs of the face Iris brown, tarsi and toes covered with hairs of a white colour freckled with brown, claws very long, and yellowish. Total length about two feet.

1300 —THE HAWK-OWL

(*Surnia funerea*) This is the Strix Ulula, Linn; Strix funerea, Gmel, Forst; Strix Hudsonia, Gmel., Strix Canadensis et Freti Hudsonis, Briss, Strix Hudsonia, Wils, Strix nisoria, Meyer, Chouette de Canada et Chouette Epervière, ou Caparacoch, and Chouette à longue queue de Sibérie, Buffon, (Enl 463, a very good figure of this species, under the erroneous name of the Ural mountains Owl,) Chouette Epervière, Sonn, Sperbereule, Meyer, Naum, Habichtseule, Bechst, Plattkopfige and Hochkopfige Habichtseule, Brehm; Hawk-Owl of Pennant and Wilson, Little Hawk-Owl of Edwards, Canada Owl of Latham, Paypaw theecawsew or Cobadecootch of the Cree Indians, Theechazza of the Copper Indians and Chepewyans; and Ood no hæroot of the Esquimaux

The Hawk-Owl is a native of the arctic regions of both continents, it sometimes appears in Germany during the winter retiring northward on the return of spring It seldom visits France, and though one settled and was taken on board a collier vessel a few miles off the coast of Cornwall, in 1830, it does not appear to have been ever seen within the shores of our island. Wilson says that this species is rare in Pennsylvania and the more southern of the United States, its favourite range being along the borders of the arctic regions, making occasional excursions southward when compelled by severity of weather, and consequent scarcity of food. The facial disc of the hawk-owl is very limited; its head is comparatively small, and the face narrow, approaching in resemblance to that of some of the Harriers (Circus) It preys moreover by day, its eyes being adapted for a dull light, and its flight is steady. From these circumstances it has obtained its English appellation. Fig. 1301 represents the Head in profile. From the writer alluded to, we learn that it is bold and active, and will follow the fowler, carrying off his game as soon as shot.

According to Dr. Richardson, the Hawk-Owl remains all the winter in high northern latitudes, and is rarely seen so far south as Pennsylvania, and then only in severe winters. Wilson saw only two specimens in the United States. It is a common species throughout the Fur-countries, from Hudson's Bay to the Pacific, and is more frequently killed than any other by the hunters, which may be partly attributed to its boldness and its habit of flying about by day. In the summer season it feeds principally on mice and insects; but in the snow-clad regions, which it frequents in winter, neither of these are to be procured, and it then preys mostly on ptarmigan. It is a constant attendant on the flocks of ptarmigan in their spring migrations to the northward It builds its nest on a tree, of sticks, grass, and feathers, and lays two white eggs. When the hunters are shooting grouse, this bird is occasionally attracted by the report of the gun, and is often bold enough, on a bird being killed, to pounce down upon it, though it may be unable, from its size, to carry it off It is also known to hover round the fires made by the natives at night ('Fauna Boreali-Americana')

---

* The owl and all the hawk tribe cast up the indigestible parts of their prey, as bones, feathers, hair, claws, &c., in the form of pellets; and in the long tenanted haunt of an owl these greatly accumulate.

The colouring is as follows —Forehead dotted with white and brown, outer margin of the facial disc black, upper parts marked with brown and white spots of various forms on the borders of the wings are similar white spots disposed on a brown ground, throat whitish the other lower parts white, transversely striped with ashy brown, at the insertion of the wings a great spot of blackish brown, tail-feathers ashy brown, striped at considerable distances with transversal narrow zigzags, bill yellow, varied with black spots according to age, iris bright yellow, feet feathered to the claws Total length about fifteen inches The colours of the female are less pure than those of the male, and she is rather larger—measuring seventeen or eighteen inches.

1302 —THE GREAT OWL

(*Bubo maximus*) The generic characters of Bubo (Cuvier) are these —Conch of the ear small, facial disc imperfectly formed, two tufts or feathered horns above the eyes

This species is the Strix Bubo of Linnæus, Le grand Duc of the French, Gufo, Gufo grande, and Gufo reale of the Italians, Schuffut, Uhu, Grosse ohreule Huhu of the Germans, Uff of the 'Fauna Suecica,' Buhu of the Lower Austrians, Great Owl, or Eagle Owl, of Willughby, Ray, and Pennant

The Great Owl is the largest of the Strigidæ, and is most probably the βύας of Aristotle and the Bubo funebris mentioned by Pliny, and of which the appearance upon two occasions within the walls of Rome occasioned no little alarm, a lustration being performed each time to purify the city Butler thus humorously alludes to the circumstance —

> 'The Roman Senate when within
> The city walls an owl was seen
> Did cause their clergy with lustrations
> (Our Synod calls humiliations)
> The round faced prodigy t' avert
> From doing town and country hurt"

The great or eagle owl is a native of the extensive forests of Hungary Russia, Germany, and Switzerland, and is said to occur eastward as far as Kamtchatka It is rare in France and never seen in Holland Pennant states that it has been shot in Yorkshire, and Latham adds Kent and Sussex as localities in which it has been found it is said to have been seen also in Orkney In Mr Stewart's 'Catalogue of the birds of Donegal, is the remark that "four of these birds paid us a visit for two days after a great storm from the north, when the ground was covered with snow. They have not been since seen here As I am informed that a pair of them breed in Tory Island, about nine miles to the north of this coast, it is probable that they came from that island I have heard of them nowhere else' Young roes and fawns, hares, rabbits, rats, and moles, reptiles, and winged game are the prey of this species From its lonely retreat in some deep forest glen, some rift among hoary rocks where it reposes in silence during the day this winged marauder issues forth at night, intent upon its victims, its harsh dismal voice resounding at intervals through the gloomy solitudes of a wild and savage scene.

The eagle-owl makes its nest in the fissures of rocks, in old ruined and deserted castles, and similar places The eggs are two or three in number, round, and white The young are abundantly supplied with food, and the broods of partridges and moor-fowl are sadly thinned to supply their wants

This noble bird is upwards of two feet in length The upper surface is barred, waved, and streaked with black on a mingled brown and yellow ground The throat in the male is white, the under surface is yellow, with longitudinal dashes of black on the chest, and fine transverse bars below, tarsi feathered to the toes, beak and claws black, iris fine orange colour.

1303.—THE VIRGINIAN HORNED OWL

(*Bubo Virginianus*). Duc de Virginie of Buffon, Netowky-omesew of the Cree Indians, according to Mr. Hutchins; Otowuck-oho, of the Crees of the plains of the Saskatchewan, according to Dr Richardson.

The species is a native of North America, being found in almost every quarter of the United States, and in the Fur-countries where the timber is of large size.

Wilson thus describes the haunts and habits of the Virginian horned owl —"His favourite residence is in the dark solitudes of deep swamps, covered with a growth of gigantic timber, and here, as soon as the evening draws on, and mankind retire to rest, he sends forth such sounds as seem scarcely to belong to this world . Along the mountain shores of the Ohio, and amidst the deep forests of Indiana alone and reposing in the woods, this ghostly watchman has frequently warned me of the approach of morning, and amused me with his singular exclamations Sometimes sweeping down and around my fire, uttering a loud and sudden 'Waugh O! Waugh O!' sufficient to have alarmed a whole garrison He has other nocturnal solos, one of which very strikingly resembles the half-suppressed screams of a person suffocating or throttled Wilson treats this visitation like a philosopher, but after reading his description and that of Nuttall ('Ornithology of the United States'), we shall cease to wonder at the well told tale in 'Fauna Boreali Americana,' of the winter night of agony endured by a party of Scottish Highlanders who according to Dr Richardson had made their bivouac in the recesses of a North American forest, and inadvertently fed their fire with a part of an Indian tomb which had been placed in the secluded spot The startling notes of the Virginian horned owl broke upon their ear, and they at once concluded that so unearthly a voice must be the moaning of the spirit of the departed, whose repose they supposed they had disturbed

The flight of this bird is elevated, rapid, and graceful It sails with apparent ease in large circles and rises and descends without the least difficulty, by merely inclining its wings or its tail as it passes through the air Now and then it glides silently close over the earth with incomparable velocity and drops as if shot dead on the prey beneath At other times it suddenly alights on the top of a fence stake, or dead stump, and utters a shriek so horrid, that the woods around echo to its dismal sound During the utterance of the deep gurgling cries so well described by Wilson, it moves its body and particularly its head, in various grotesque ways and at intervals violently snaps its bill Its food consists of various gallinaceous birds, half grown turkeys, domestic poultry of all kinds ducks grouse, hares, opossums and squirrels and whenever chance throws a dead fish on the shore this bird feeds on it with peculiar avidity The Virginian horned owl is very powerful, and equally spirited Mallards guinea fowl, and common fowls fall an easy prey, and are carried off in its talons to the depths of the woods When wounded, says Audubon, it exhibits a revengeful tenacity of spirit scarcely surpassed by the noblest of the eagle tribe disdaining to scramble away it faces its enemy with undaunted courage, protruding its powerful talons and snapping its bill Its large goggle eyes open and shut in quick succession and the feathers of its body are puffed up, and swell out its apparent bulk to nearly double the natural size In some districts it is a great nuisance to the settler making sad havoc among his stock of poultry Among some of the Indian nations a sort of reverential horror is entertained towards this bird and the priests and conjurers have adopted it as the symbol of their office carrying about with them a stuffed specimen with glass eyes which excites general awe This bird usually constructs a bulky nest in the forked branch of a tree, composed externally of crooked sticks and lined with coarse grass and feathers The eggs are three or four in number, and of a dull white

In size this species is nearly if not quite, as large as its European representative the eagle owl and in the general style of colouring is similar the upper parts being waved and mottled with black and brownish red a tinge of grey as the ground colour prevails on the lower part of the back the throat is pure white the rest of the under surface is marked by innumerable narrow transverse dusky bars on a reddish ground colour, thinly interspersed with white, beak and claws black iris bright orange, facial disc brown with a margin of black

1304, 1305 —THE BURROWING OWL

(*Noctua cunicularia*) This singular little owl (if the species be identical) is widely spread through the American continent, everywhere inhabiting burrows, it is diurnal in its habits as well as terrestrial, is of slender contour and walks about with ease elevated on long naked tarsi, the fascial disc is circumscribed (C L Bonaparte thus describes the strange economy of this bird —

"In the trans-Mississippian territories of the United States the burrowing owl resides exclusively in the villages of the marmot or prairie dog, whose excavations are so commodious as to render it unnecessary that our bird should dig for himself, as he is said to do in other parts of the world where no burrowing animals exist. These villages are very numerous, and variable in their extent, sometimes covering only a few acres, and at others spreading over the surface of the country for miles together. They are composed of slightly elevated mounds, having the form of a truncated cone, about two feet in width at the base, and seldom rising as high as eighteen inches above the surface of the soil. The entrance is placed either at the top or on the side, and the whole mound is beaten down externally, especially at the summit, resembling a much used footpath

'From the entrance, the passage into the mound descends vertically for one or two feet, and is thence continued obliquely downwards, until it terminates in an apartment, within which the industrious marmot constructs, on the approach of the cold season, a comfortable cell for his winter's sleep This cell, which is composed of fine dry grass, is globular in form, with an opening at top capable of admitting the finger, and the whole is so firmly compacted, that he might, without injury, be rolled over the floor

'In all the prairie-dog villages the burrowing owl is seen moving briskly about, or else in small flocks scattered among the mounds, and at a distance it may be mistaken for the marmot itself when sitting erect They manifest but little timidity, and allow themselves to be approached sufficiently close for shooting, but if alarmed, some or all of them soar away and settle down again at a short distance, if further disturbed their flight is continued until they are no longer in view, or they descend into their dwellings, whence they are difficult to dislodge

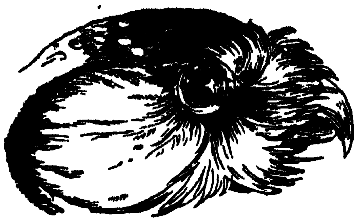
The burrows into which these owls have been seen to descend on the plains of the river Platte (a tributary to the Missouri), where they are most numerous, were evidently excavated either by the marmot whence it has been inferred by Say that they were common though unfriendly residents of the same habitation, or that our owl was the sole occupant of a burrow acquired by the right of conquest That the latter idea is correct was clearly presented by the ruinous condition of the burrows tenanted by the owl, while the neat and well preserved mansion of the marmot showed the active care of a skilful and industrious owner We have no evidence that the owl and marmot habitually resort to one burrow, yet we are well assured by Pike and others that a common danger often drives them into the same excavation, where lizards and rattlesnakes also enter for concealment and safety The owl observed by Vieillot in St Domingo digs itself a burrow two feet in depth, at the bottom of which its eggs are deposited on a bed of moss, herb stalks, and dried roots

The note of our bird is strikingly similar to the cry of the marmot which sounds like Cheh Cheh, pronounced several times in rapid succession, and were it not that the burrowing owls of the West Indies, where no marmots exist, utter the same sound it might be inferred that the marmot was the unintentional tutor to the young owl this cry is only uttered as the bird begins its flight The food of the bird we are describing appears to consist entirely of insects as on examination of its stomach nothing but parts of their hard wing cases were found"

Azara describes the burrowing owl of Paraguay under the name of Suinda He states that "it never enters woods or perches upon trees, but exclusively haunts the open country where game abounds, making its nest and concealing itself in the holes or kennels of the armadilloes, which are not very deep but well lined with hay and straw" Mr Darwin states that this species, on the plains of Buenos Ayres exclusively inhabits the holes of the bizcacha or viscacha (see page 71), but that in Banda Oriental it is its own workman 'During the open day, but more especially in the evening, says this acute observer, "these birds may be seen in every direction, standing frequently by pairs on the hillocks near their burrows If disturbed, they either enter the hole, or, uttering a shrill harsh cry, move with a remarkably undulatory flight to a short distance, and then turning round steadily gaze at their pursuer Occasionally in the evening they may be heard hooting I found in the stomachs of two which I opened the remains of mice, and I one day saw a small snake killed and carried away. It is said these latter animals are their common prey during the daytime I may here mention, as showing on what various kinds of food owls subsist, that a species that was killed among the islets of the Chonos Archipelago had its stomach full of good-sized crabs ('Journal of Researches in Geology and Natural History')

The general colour of this owl above is light burnt umber spotted with whitish, the wings are darker, the lower part of the breast and under parts whitish. Length about ten inches.

1300.—Hawk-Owl



1301.—Head of Hawk-Owl

1298.—Barn Owl

1304.—Burrowing Owls and Prairie Dogs

1299.—Ural Owl

1302.—Great Owl.

1305.—Burrowing Owl.

1303.—Virginian Horned Owl.

1306.—Bird asleep.

1309

1307.—Leg of Bird Perched

1310.—Foot of Night Jar.

1311

Head and Foot of Night Jar

1315.—Night Hawks

1314.—Great Ibijau

[illegible]

1308.—Head of Roller showing the Vibrissæ

1312.—Night-Jar.

ORDER INSESSORES (Vigors).

That eminent ornithologist, Mr. Vigors, established this extensive order for the inclusion of the Picæ and Passeres of Linnæus; groups, it must be confessed, containing, especially the former, an ill-sorted union of genera, and which Cuvier had previously re-arranged, not, indeed, in one order, as was subsequently done by Mr. Vigors, but in two, viz., "Passereaux," or "Passeres," and "Grimpeurs," or "Scansores;" whereas Mr. Vigors makes the Scansores (or Parrots, Cuckoos, Trogons, &c.) a tribe of the Insessores. For ourselves we must say that we conceive the group Scansores, whether we regard it as an order or as a tribe of an order, to be anything but natural, and, to confess our opinion, we think that the whole order Insessores requires utterly re-modelling. It is not, however, here our place to enter into any scientific disquisitions; we shall, therefore, pause, merely observing that though we enumerate the tribes as instituted by Mr. Vigors, we shall, as we proceed, attend only to the natural families into which they are resolvable, and so leave any subsequent arrangement open.

The Insessores, then, are divided by Mr. Vigors into the following tribes or primary sections —

1. *Fissirostres*, including Night-jars, Swallows, King-fishers, &c.
2. *Dentirostres*, viz., Flycatchers, Shrikes, Thrushes, Warblers, &c.
3. *Conirostres*, viz. Finches, Starlings, Crows, Hornbills, &c.
4. *Scansores*, viz., Toucans, Parrots, Woodpeckers, Tree-creepers, and Cuckoos.
5. *Tenuirostres*, viz., Sun-birds, Humming-birds, Honey-suckers, Hoopoes, &c.

The term Insessores * means "perching-birds," and must be defined rather by negations than any positive characters: it includes all birds which are neither raptorial, nor gallinaceous, nor waders, nor swimmers; yet do its subjects feed on every kind of diet, from flesh to grain, and they exhibit every variety of habits and manners, from those of the voracious raven to those of the tiny humming-bird or brilliant honey sucker; consequently their beak, plumage, limbs, and digestive organs are as diversified as their modes of life. Take, for example, the parrot and the cuckoo—and yet these are both examples not only of one order, but of one tribe.

Leaving all this, however, we may proceed to observe that the security and firmness with which birds perch have often excited surprise, and no doubt led many to conjecture that there must be some peculiarity in the mechanism from which such tenacity of grasp proceeds. Fig. 1306 represents a bird in a perched attitude asleep, with the leg dissected, after Borelli, and in which the mechanism is shown, but much more clearly at Fig. 1307, the anatomy of the leg of a bird at rest—nothing can be more simple, yet more effective. *a* is a muscle which arises from the haunch bone, and becoming suddenly tendinous, passes over the outer angle of the thigh-joint (analogous to our knee) at *b*, then winding down the bone, being diverted from its straight course, and firmly bound down so as not to slip, it passes posteriorly over the angle of the tarsal joint, *c*, and proceeds down the back of the tarsus to the under side of the toes, *d*, into the bones of which slips from it are respectively inserted. From this arrangement it is evident that when the bones of the leg and thigh are bent together (the joints forming acuter angles) by the weight of the sleeping bird, the tendon will be stretched more and more over the angles *b* and *c*, and the toes become more strongly drawn together or clasped. Hence birds can rest as easily, perhaps more so, on one leg than on both, and, as is well known, it is on one leg only that most sleep perched, while the flexibility of the neck allows it to be turned back upon the body, and the head brought under the wing, so as to throw the centre of gravity more over the feet, and thereby increase the stability.

Fig. 1308 relates to a different subject, and exhibits the Vibrissæ or Bristles round the base of the beak of the Roller. Most birds which feed on insects are distinguished by a fringe of bristles at the base of the beak, not unlike the whiskers of the cat, and evidently intended to aid them in capturing their prey. These bristles are larger in the night-jars than in most other birds; but are very distinct in our small insectivorous feathered tribes generally, as the nightingale, red-breast, shrike, flycatcher, and the roller, selected by way of example. To these vibrissæ we shall have to make frequent allusion.

Family CAPRIMULGIDÆ (NIGHT-JARS or GOATSUCKERS).

The birds composing the present family are crepuscular and nocturnal in their habits; they spend the hours of day in repose, shrouding themselves from observation in the gloom of woods, or amidst the dense foliage of trees; coming forth at evening to feed upon such insects as, like themselves, are roused from inertion by the advance of darkness. They take their prey upon the wing, and perform during the chase the most elegant aërial evolutions. Their eyes are large and of the true nocturnal character, the beak is small, but the gape is enormous, extending below the eyes, reminding us of the mouth of a toad (see Fig. 1309, the Head of the common Night-jar); its margin is fringed with strong vibrissæ; the wings are long and pointed; the tarsi usually very short, the hind toe is, in some genera, united close to the base of the inner toe, and directed almost as equally forwards; the middle of the three anterior toes is the longest, and in the genus Caprimulgus is armed with a long claw, having a comb-like (pectinated) inner margin. (See Figs 1310 and 1311, the foot of the Night-jar.)

The plumage is full and soft, and beautifully variegated with dots, bars, dashes, and zigzag marks of mingled grey, brown, fawn-colour, black, and white, difficult to describe and almost as difficult to imitate. Rapid and abrupt as is the flight of these birds, still it is noiseless; resembling in that respect the flight of the owl, and from the same cause—the laxness, the want of rigidity in the quill-feathers: but, from the form of the wing, the flight is of a different character. Some have the sides of the head adorned with tufts of soft feathers.

1312, 1313.—The Night Jar

(*Caprimulgus Europæus*). This is the Goatsucker, Jar owl, Churn-owl, Fern owl, Dor-hawk, Night-hawk, and Wheel-bird of various writers, Αἰγοθήλης of the Greeks; Caprimulgus of the Latins; Calcabotto Piattaglione, Porta quaglie, Boccaccio, and Cova-terra of the modern Italians, Chotacabras of the Spaniards, Tette-chevre, Engoulevert, and Crapaud volant of the French, Milchsauger, Geissmilcher, Nacht Rabe, Nacht Shewalbé, and Tagschläfer of the Germans; Natskraffa, Natskarra, and Quallknarren of the 'Fauna Suecica,' Natravn, Nat-skade, and Aften-bakke of Brunnich, Muckenstecker and Nachtrabb of Kramer, Aderyn y droell and Rhodwr of the ancient British.

An evil name has this beautiful bird had from the earliest times, and among almost all European nations. Aristotle, who describes it under the title Αἰγοθήλης, accuses it of flying upon goats and sucking them (whence its Greek name), and adds as a common report, that the teat of the goat afterwards becomes dry, and the animal itself blind. Ælian's version is nearly to the same effect, and so also is Pliny's. In France the same erroneous opinion has long been entertained, and also in Italy, as well as in Germany and England; in short, it seems to be a superstition of universal prevalence. In our country it is not the udder of the goat, but that of the cow, that it is supposed to drain (a nefarious practice attributed also to the poor little hedgehog), and not this only, for, as White says ('Selborne'), "the country people have a notion that the fern owl or churn-owl or eve jar, is very injurious to weaning calves, by inflicting, as it strikes at them, a fatal distemper." Thus does this harmless, ill-fated bird fall under a double imputation which it by no means deserves,—in Italy, of sucking the teats of goats, whence it is called Caprimulgus, and with us, of communicating a deadly disorder to cattle." The disease in question is in reality occasioned by the ravages beneath the skin of the maggots of a species of fly (œstrus), and if the fern-owl was ever seen making a sweep near the suffering calves, that is, as it would appear, striking at them, it was in order to snap at some insect, from the torments of which the calf would be gladly freed.

The night jar preys upon moths, chaffers, and other large insects, and may be often seen, when the sun begins to set, darting in chase of its food, displaying almost unequalled rapidity of flight, and the most rapid and surprising evolutions, yet it flits along noiseless as a shadow, not a rustle is heard. On many occasions, in days past by, we have watched this interesting bird thus occupied, and we have seen it settle, and with head depressed almost to the perch on which it rested, and swollen quivering throat, utter its jarring vibratory note, and again give chase to its prey. White says, and though we never observed it ourselves, we fully believe it, that "when a person approaches the haunt of the fern-owls in an evening, they continue flying round the head of the obtruder, and by striking their wings together above their backs, in the manner that the pigeons called smiters are known to do, make a smart snap; perhaps at that time they are jealous for their young, and their noise and gesture are intended by way of menace."

It is not often that this bird utters its churring sound in the air; but usually when perched, a bare branch, high palings, or the ridge of any building being chosen as a resting place. The fern-owl does not perch across the branch, as birds in general do, but lengthwise, and rests upon it, instead of grasping it, and that with the head low, so as almost to touch it. The male sometimes utters a small squeak repeated four or five times, when playfully chasing his mate through the boughs of trees.

Much has been said and written respecting the pectinated claw on the middle toe of the fern-owl, but its use has not yet been explicitly determined. White supposed it to serve in the capture of its prey; but that the bird should strike at its prey with its little feet and short legs is out of the question; when observed by White to bring its foot to its beak during flight, might it not have been clearing its bill and vibrissæ of the hard wing-cases and limbs of the beetles it had captured? In which case the worthy historian of Selborne would indeed have seen what he relates, incorrect as we deem his inference. It is remarkable, however, that other birds of very different habits, as the heron, &c., have the claws similarly pectinated: may not this modification be connected with their mode of perching on the bare branches of trees? These are queries yet to be decided: certainly the serrations, whether in the fern-owl or the heron, have nothing to do with the seizure or retention of prey; in fact, the comb-like teeth are directed obliquely forwards, not backwards, as they ought to be, if intended as retainers of struggling or slippery captives.

The fern-owl, or night-jar, is a bird of passage, arriving on our island in May, and departing in September. It is spread over all the southern and middle districts of Europe, and retires to pass the winter in Africa. Woods skirting heaths, or common lands, plantations of oak, or rows of sycamores near farm-houses, are the favourite spots which it haunts. It builds no definite nest, but lays its eggs on the ground among fern or heath, or under the protection of shrubs, they are two in number, marbled with white, yellowish brown, and grey.

The plumage of this bird is beautifully diversified with a rich and intricate commingling of grey, black, brown, rufous, and yellowish, in dots, dashes, and zigzag bars, the latter being conspicuous on the under parts and tail. Length almost ten inches.

1314.—The Great Ibijau

(*Nyctibius grandis*). Caprimulgus grandis, Latham; Grand Crapaud volant de Cayenne, Buffon. The principal character of the genus Nyctibius consists in an obtuse tooth on each edge of the upper mandible of the beak.

This bird is a native of South America, and in general habits resembles the night-jar, being nocturnal and insectivorous, pursuing its prey on rapid pennons, during the day it haunts hollow trees, especially in the neighbourhood of water. The bill is much depressed, and broad at the base; the tail is rather rounded; the hind toe is stout and flattened. The general plumage is brown, speckled with black, fulvous, and white, the ground-colour is deepest on the breast, head, neck, and lower parts barred. Length nearly thirteen inches.

1315.—The Night-Hawk

(*Chordeiles Americanus*). Caprimulgus Americanus, Wilson, C. Virginianus, Prince of Musignano and Canino.—Edge of beak smooth, tail forked. This bird is common in the United States of America, and ranges in summer through the Fur-countries of the north, even to the remotest arctic islands. It is the musquito hawk described in Parry's first voyage. Its manners, as described by Wilson, remind us closely of those of our own night-jar. It is a bird of strong and vigorous pinions, and in dull and cloudy weather is abroad during the day, giving chase, like the swallow, to its insect prey, sometimes at a considerable height, sometimes skimming over marsh and meadow, and uttering shrill squeaks as it dashes along. Often from an elevation of 60 or 80 feet, will the male, hovering over the female engaged in the duty of incubation, dart suddenly down, head foremost, with inconceivable rapidity, and as suddenly wheel up, uttering, at the moment he makes the turn, a loud vibratory booming sound, produced by the sudden expansion of his capacious mouth as he sweeps through the air. Having mounted, he again repeats this aerial feat, with the same impetuosity and the same sound as before. The female lays her eggs on the bare ground, these are two in number, of a dirty white, thickly marbled and dashed with dark olive-brown. Like our British species, this bird perches lengthwise on the branches of trees, or on the edge of fences. During the time the female is sitting she will permit a person to approach her within a foot or two, before she attempts to stir, and then, like our lapwing, feigns lameness, and flutters and tumbles about, keeping just before the pursuer, till she has drawn him to a distance from the spot; when, just as he hopes to succeed in catching her, she mounts and disappears in an instant. The young when just hatched are very shapeless, and covered with fine brownish down. When the night-hawk is wounded and captured, it opens its mouth widely, utters a guttural whizzing noise, and strikes with its wings, but never with the bill or claws. The general ground-colour of the plumage is dark liver-brown glossed with greenish, head, neck, and wing-coverts spotted with yellowish brown, back and tertials mottled with brownish white and greyish brown, a band of white across the middle quill-feathers, a white broad arrow shaped mark on the throat, and a white dotted stripe above the eyes Plumage below barred with brownish white and dark liver brown, tail barred, claw of middle toe serrated. Length nine inches and a half

---

* Though we would not carp at terms, yet it must be acknowledged that this conveys no definite or restrictive idea; for eagles, hawks, and owls perch, as well as ravens, and better than woodpeckers.

1316 —The Whip poor-Will

(*Caprimulgus vociferus*) Female and Young This species, universally spread over all the United States of America, has received its name from the singularity of its notes, which seem to articulate the words Whip poor Will with considerable distinctness, the first and last syllables being uttered with great emphasis, and when two or more males meet, they seem as if endeavouring to overpower each other by the vehemence of their vociferations At these times, and indeed generally, they fly low, skimming round the house or barn, and alighting on stacks, palings, or the roof Towards midnight they generally become silent unless a clear moonlight, when they are heard without intermission till morning It is about the 25th of April, according to Wilson that this bird is heard in Pennsylvania, and in Kentucky about the 14th, commencing its call as the dusk begins to set in, and hundreds are sometimes heard at once in different parts of the wood, striving to outdo each other Early in June when the young appear, the notes of the male usually cease but towards the latter end of the summer they are again occasionally heard, though with less vehemence and emphasis than in the spring Early in September the birds all move southwards, performing a regular migration

The favourite haunts of this species are high dry barren or hilly situations, they seldom visit low marshy tracts, or the low lands along the sea coast, they abound in the barrens of Kentucky where in April and May their confused clamour is incessant every evening, and, as Wilson asserts, extremely agreeable to the inhabitants, who are lulled to sleep by their voices, to which, especially on the approach of dawn, the full-toned "tooting" of the pinnated grouse forms a pleasing bass

The food of this species of Caprimulgus consists of various sorts of insects its flight in the pursuit is rapid, zigzag, and noiseless, but it utters during the time a low murmuring sound Its general habits and mode of perching resemble those of our British night jar

The female lays her eggs on the bare ground and puts every "ruse" in practice to decoy intruders from her young, which are little shapeless things covered with a down like mould, and scarcely to be seen amidst the withered leaves It would appear that, if the young be disturbed, the parent bird removes them to a more secure locality During the day the Whip-poor Will, unlike the night hawk, is completely confused by the light, and it sits sleeping on a low branch or log, or even on the ground, and that so soundly that with caution a person may pass within a very short distance of it without disturbing it When startled, however, it flies off but only to a short distance and soon again, if unmolested, settles into tranquil slumber

The plumage of this species is soft the general colour of the upper parts is dark brownish grey, streaked and minutely sprinkled with brownish black cheeks brownish red, quill feathers and coverts dark brown, spotted in bars with light brown the three lateral tail-feathers white at the tips A yellowish white transverse band across the fore part of the neck, under parts paler than the upper, and mottled Length nine inches

1317 —The Chuck-Will's Widow

(*Caprimulgus Carolinensis*) The name of this species is taken from its cry, which it utters with great clearness, repeating the sound Chuck Will's-Widow loudly and distinctly six or seven times in succession, then stopping and repeating it again It is to the southern parts of the United States of America that this bird pays its annual visit, coming from Mexico, and perhaps still warmer climates, where it sojourns during the winter Louisiana, Florida, and the lower portions of Alabama and Georgia, are the districts in which it chiefly abounds. Ravines, swamps, and extensive pine-ridges are alike resorted to by the Chuck-Will's-Widow, its food abounding equally in all those places, which also afford it ample means of safety during the day. It principally roosts in the hollow of decayed trees or prostrate logs, and often in company with bats, which cling to the sides of the cavities. "When surprised in such situations," says Audubon, "instead of trying to effect their escape by flying out, they retire backwards to the farthest corners, ruffle all the feathers of the body, open the mouth to its full extent, and utter a hissing kind of murmur, when seized and brought to the light of day, they open and close their eyes in rapid succession as if it were painful for them to encounter so bright a light, they snap their little bills in the manner of flycatchers, and shuffle along as if extremely desirous of making their escape" During the hours of dusk they are all animation, and display the most rapid and varied evolutions in the air wheeling, sweeping along, mounting and descending with admirable ease and grace The mode of incubation resembles that described of the other species and the manner of perching is the same The young, and also the eggs, if meddled with, are removed to another spot "When the Chuck-Will's Widow," says Audubon, "either male or female, for each sits alternately, has discovered that its eggs have been touched, it ruffles its feathers, and appears extremely dejected for a minute or two after which it emits a low murmuring cry, scarcely audible to me as I have lain concealed at a distance of 18 or 20 yards At this time I have seen the other parent reach the spot flying so low over the ground that I thought its little feet must have touched it as it skimmed along After a few low notes and some gesticulations, I have witnessed each take an egg in its large mouth and both fly off together skimming closely over the ground until they disappeared among the branches and trees But to what distance they remove their eggs I have never been able to ascertain, nor have I ever had an opportunity of witnessing the removal of the young Should a person coming upon the nest when the bird is sitting, refrain from touching the eggs the bird returns to them and sits as before this fact I have also ascertained by observation The Chuck-Will's-Widow arrives in Georgia about the middle of March, and in Virginia early in April and immediately gives notice of its arrival by its evening call numbers keeping up the chorus during the hours of twilight and through the night if it be clear They leave the United States towards the latter end of August The colours of the plumage of this elegant bird consist of yellow ferruginous and blackish brown blended and mingled together the head and back are dark brown minutely mottled with yellowish red, and longitudinally streaked with black the wings are barred with yellowish red and brownish black and minutely sprinkled with the latter colour Tail similarly barred and sprinkled the inner webs of the three outer feathers white Under parts blackish sprinkled with yellowish red a slight band of whitish across the fore part of the neck

1318 —The Guacharo

(*Steatornis Caripensis*, Humboldt This extraordinary bird was discovered by Baron Humboldt in the cavern of Caripe, called Cueva del Guacharo in the province of Cumana which it haunts in thousands and either the same or a closely allied species was seen by him in a ravine, traversed by two natural bridges of the valley of Icononzo (Cordilleras, visited by himself and Bonpland on their way from Santa Fe de Bogota to Popayan and Quito This ravine is represented at Fig 1319, and the distance of the upper bridge from the little mountain torrent below is about 315 feet It is in this deep ravine 'that these birds congregate flitting in the gloom like foul spirits, as if unwilling to meet the light of garish day' In the middle of this second bridge there is a hole, of about ninety square feet in area, through which can be seen the bottom of the abyss below The torrent seems as if it flowed away into a dusky cavern, and a mournful sound falls on the ear proceeding from an infinite multitude of night-birds that dwell in the dusky cleft and are to be seen in thousands hovering over the water It is impossible, however, to catch any of them and the only mode of obtaining anything like a distinct view of them is by throwing down squibs or torches to produce a momentary light They were described by the Indians who call them Cacas) as being about the size of a hen, and having the eyes of an owl, with crooked beaks The colour of their plumage is uniform throughout, and of a brownish grey, whence Humboldt rightly conjectures that they belong to the Caprimulgidæ, of which there are many varieties in this region The stream, over which these bridges are suspended, flows from east to west, and the view in our illustration is taken from the northern part of the valley, from a point where the arches are seen in profile

With respect to the Cueva del Guacharo, it is not actually in the valley of Caripe, but at the distance of three leagues from the convent, and is pierced in the vertical profile of a rock, the entrance is to the south, forming a vault 80 feet broad and 72 high The rock surmounting the cavern is covered with trees of gigantic height, and all the luxuriant profusion of an intertropical climate; and it is worthy of observation that this luxuriance of vegetation penetrates even into the vestibule of the cave The travellers saw with astonishment plantain-leaved heliconias 18 feet in height, the praga-palm, and tree-arums follow the banks of the river even to the subterranean places The party went forwards for about 430 feet without being obliged to light their torches Where the light began to fail, they heard from afar the hoarse cries of the Guacharo birds. These birds quit the cave only at nightfall, especially when there is moonlight, and Humboldt remarks that it is almost the only frugivorous night bird yet known It feeds on very hard fruits (an exception to the rule among the Caprimulgidæ), and the Indians assured him though we place little dependence on their statement) that it does not pursue either the hard winged insects or the moths that serve as the food of this tribe of birds It is, he states difficult to form any idea of the horrible noise made by thousands of the Guacharo birds in the dark recesses of the cavern, whence their shrill and piercing cries strike upon the vaulted rock, and are repeated by the echo in the depths of the grotto By fixing torches of copal to the end of a long pole, the Indians showed the nests of these birds fifty or sixty feet above the heads of the explorers, in tunnel-shaped holes, with which the cavern roof is pierced like a sieve

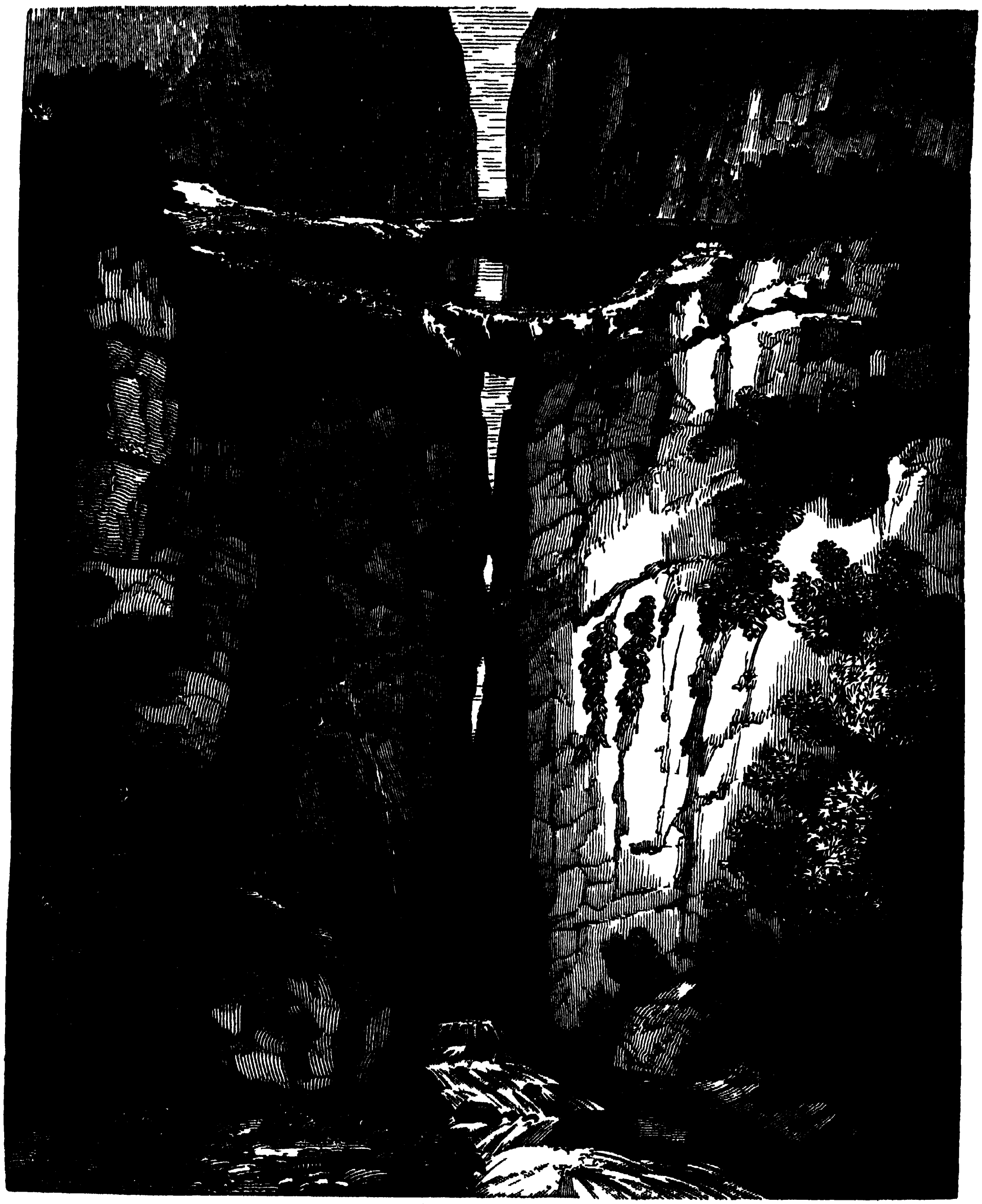
Once a year near midsummer, the Guacharo cavern is entered by the Indians Armed with poles, they ransack the greater part of the nests, while the old birds hover over the heads of the robbers, as if to defend their brood uttering horrible cries The young which fall down are opened on the spot The peritoneum is found loaded with fat and a layer of the same substance on the abdomen forms a kind of cushion between the bird's legs At the period above-mentioned, which is generally known at Caripe by the designation of 'the oil-harvest,' huts are built by the Indians with palm leaves near the entrance and even in the very porch of the cavern There the fat of the young birds just killed is melted in clay pots over a brushwood fire, and this fat is named butter or oil (manteca or aceite) of the Guacharo It is half liquid transparent inodorous and so pure that it will keep above a year without becoming rancid In the kitchen of the monks of the convent of Caripe no other oil is used and Humboldt never found that it imparted a disagreeable taste or smell to the aliments The quantity of very pure manteca collected does not exceed 150 or 160 bottles, each being sixty cubic inches the rest, which is less transparent is preserved in large earthen vessels the whole hardly seems to correspond with the immense annual carnage of birds* The use of the Guacharo oil is very ancient, and the race of Guacharo birds would have been extinct long since if several circumstances had not contributed to its preservation The natives, withheld by superstitious fears seldom dare to proceed far into the recesses of the cavern Humboldt had great difficulty in persuading them to pass beyond the outer part of the cave the only portion of it which they visit annually to collect the oil and the whole authority of the Padres was necessary to make them penetrate as far as the spot where the floor rises abruptly at an inclination of sixty degrees and where a small subterraneous cascade is formed by the torrent In the minds of the Indians this cave inhabited by nocturnal birds, is associated with mystic ideas and they believe that in the deep recesses of the cavern the souls of their ancestors sojourn They say that man should avoid places which are enlightened neither by the sun nor the moon and 'to go and join the guacharoes' means to rejoin their fathers in short, to die. At the entrance of the cave the magicians and poisoners perform their exorcisms to conjure the chief of the evil spirits It appears also, as another cause of preservation that Guacharo birds inhabit neighbouring caverns too narrow to be accessible to man, and from these perhaps the great cavern is repeopled, for the missionaries declared that no sensible diminution of the birds had been observed Young birds of this species have been sent to the port of Cumana, and have lived there several days, but without taking any food—the seeds offered to them not suiting them The crops and gizzards of the young birds opened in the cavern contained all sorts of hard and dry fruits which are conveyed to them by their parents, these are preserved, and under the name of semilla del Guacharo (Guacharo seed) are considered a celebrated remedy against intermittent fevers, and sent to the sick at Cariaco and other low localities where fever prevails Our limits will not allow us to pursue Humboldt's description farther, and we must content ourselves with referring the reader to the 'Narrative' for many interesting de-

---

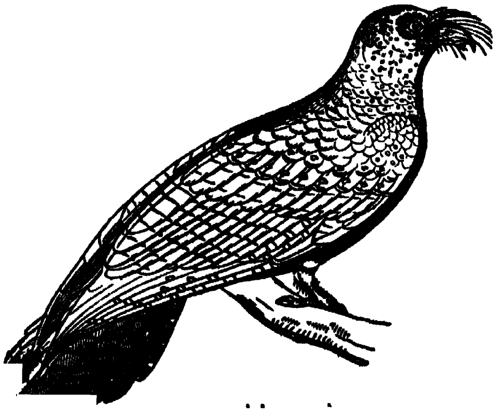
* *The author remarks that this branch of industry reminds one of the harvest of pigeon's oil, of which some thousands of barrels were formerly collected in Carolina from the young of the Passenger Pigeon, Ectopistes migratoria* (Columbidæ, vol. vii., p. 273)

1317.—Chuck-Will's Widow

1320.—Long-eared Podargus.

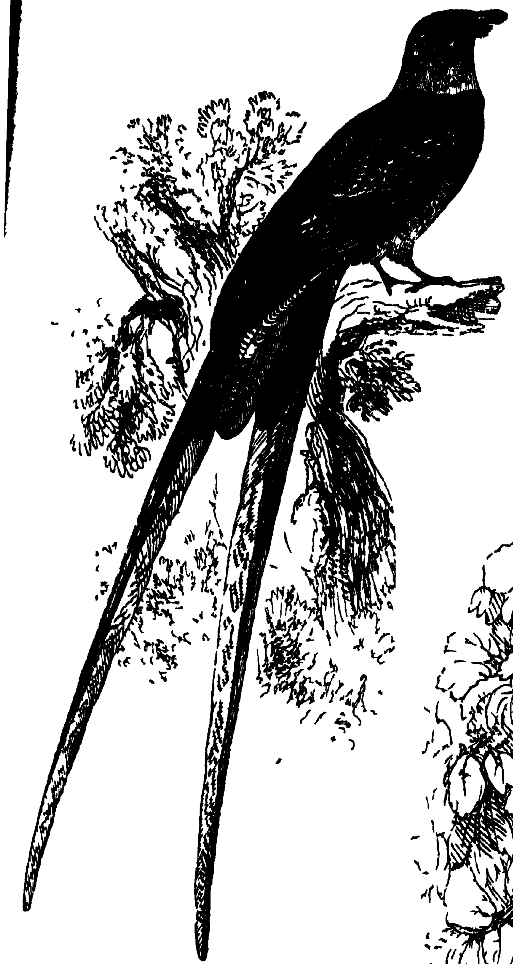


1319.—Natural Bridges of Icononzo

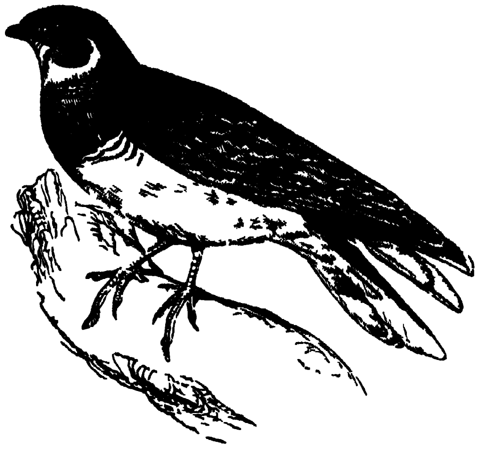


[illegible]

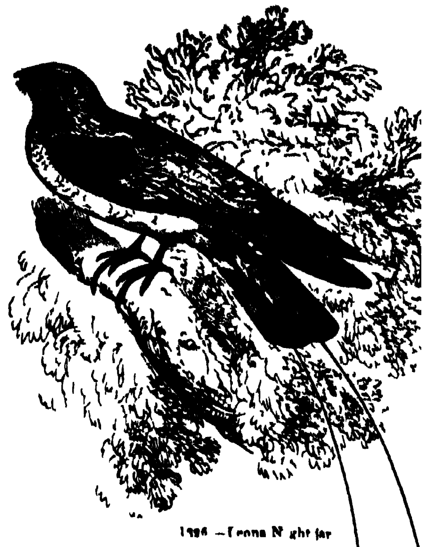
[illegible]



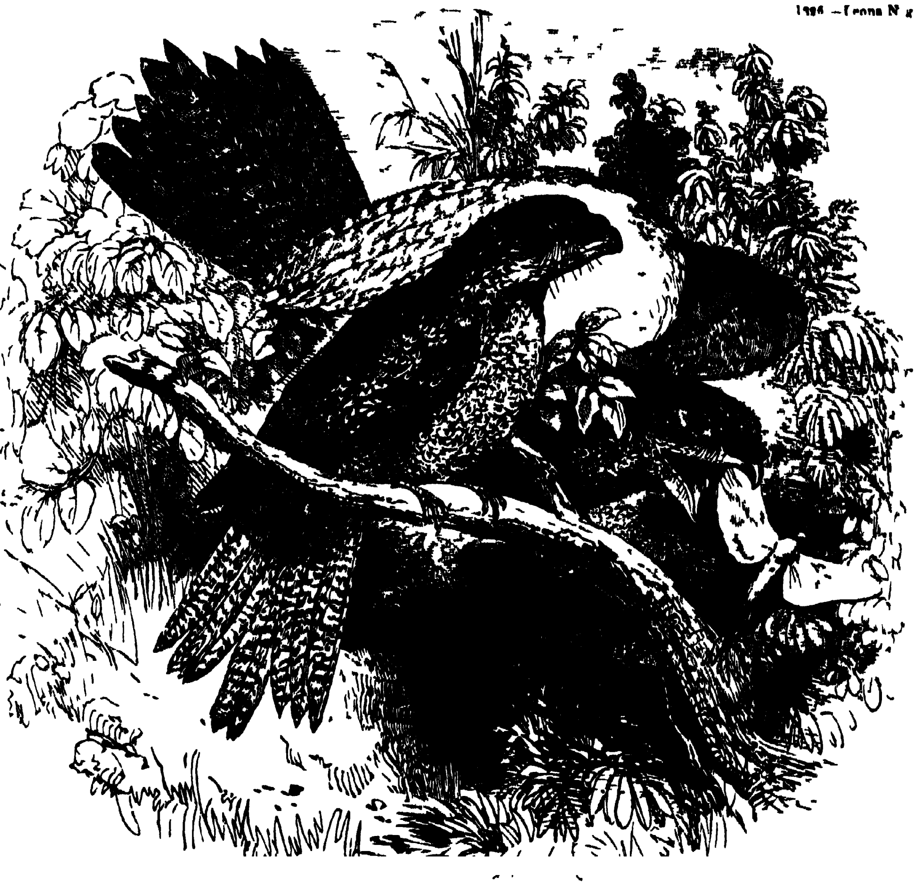
1324.—Fork-tailed Goatsucker.



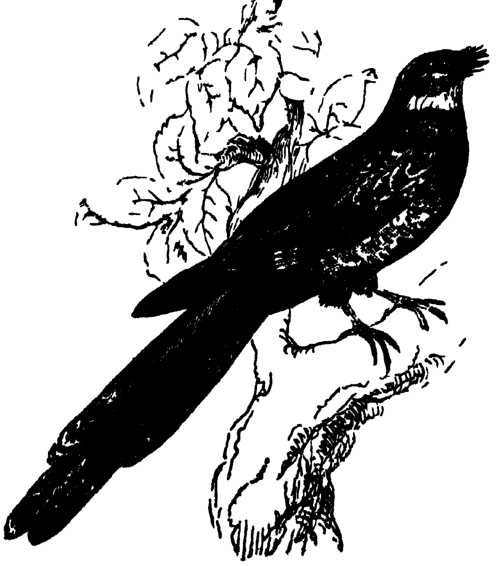
1327.—Nacunda.



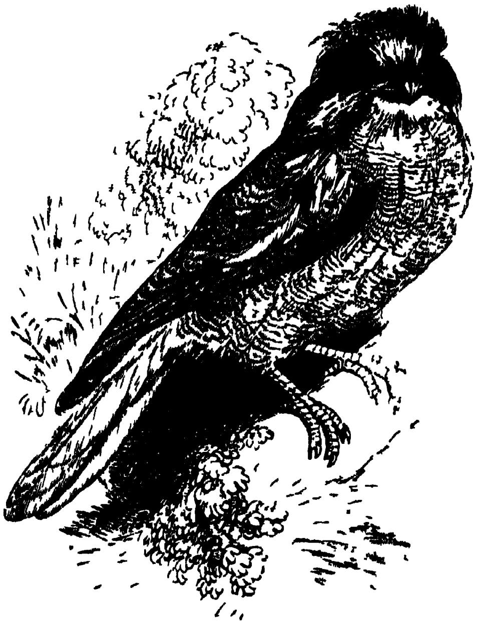
1326.—Leona Night-jar.



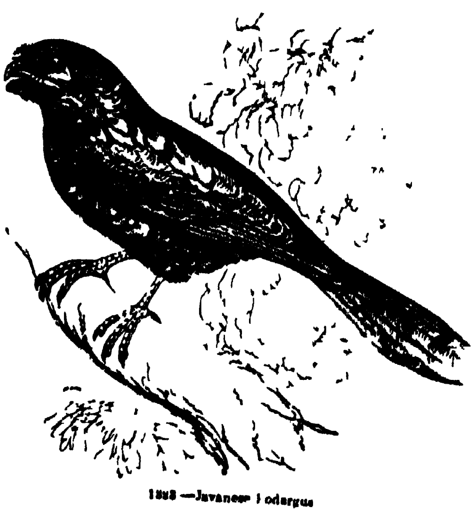
1321.—Papuan Podargus.



1325.—African Long-tailed Night-jar,



1322.—Cold-River Podargus,



1323.—Javanese Podargus.

tails respecting the cavern itself and the surrounding scenery.

1320.—The Long-eared Podargus

(*Podargus auritus*). The genus Podargus is one of the aberrant groups of the Caprimulgidæ, and as its structure departs to a certain extent from the typical form presented by our common night-jar, so also it exhibits a corresponding difference with regard to habits and manners. Exclusively confined to Australia and the islands of the Indian Archipelago, the genus Podargus contains ten or twelve recognised species, of which our Pictorial Museum contains some of the principal species. They are nocturnal in their habits, appearing stupified by day. The formation of the wing renders their flight less buoyant and undulating than in the typical night-jars, though it is at the same time rapid, and the enormous gape of the beak, conjoined with its strength, enables them to take in the largest insects The French give the name of Crapaud volant, or flying toad, to the common night-jar, in allusion to its wide gape, but the depressed form of the head and the enormous width of the gape of these birds give them a much better claim to such a title, and indeed without much impropriety they may be regarded as representatives among the feathered race of those nocturnal dusky insectivorous reptiles.

In the genus Podargus the eyes are large and staring,, the bill is robust, and the tip and margins of the upper mandible fold over those of the lower, the ridge of the upper mandible is elevated and arched: vibrissæ scanty; tarsi short, the middle claw not serrated, nor the hind toe directed forwards they perch in the ordinary manner. Many have plumelets produced by the elongation of the ear-tufts. The colouring of the plumage is sombre, and composed of deep tones of brown, black, grey, and tawny yellow blended together.

The long-eared Podargus is a native of Sumatra in its aspect it is very owl-like. Its head is voluminous, its eyes large, and the gape of its bill is enormous; and the elongation of the ear-plumes adds to the singularity of its appearance It is a recluse bird, and active only during the hours of darkness, but beyond this we know nothing of its economy. It forms the type of the sub genus Batrachostomus.

321.—The Papuan Podargus

(*Podargus Papuensis*) This is another species of the present genus, and is destitute of elongated ear-tufts. It appears to be nearly related to a Japanese species, described by Dr Horsfield under the title of Podargus Javanensis, and is very characteristic of the group to which it belongs As we have already observed, the night-jar is a migratory bird throughout every part of Europe; but whether the species of the genus Podargus obey a similar law is not very clear It is not unlikely, however, that those peculiar to Australia pass periodically from one district to another, as is the case with the greater number if not all the feathered tenants of that vast continent, which, according to the statements of travellers, migrate from region to region according to the season, and regularly return to their summer breeding haunts, summer there answering to our winter In North America, the Night-hawk, the Whip-poor-Will, and other Caprimulgidæ are migratory With respect to nocturnal habits, the members of the genus Podargus are more confused by light than the ordinary Caprimulgidæ, if we except that strange bird the Guacharo they haunt the solitudes of the woods, and the sombre but intermingled tints of their plumage screen them from observation. At night they issue forth on their aerial chase, and retire with the first streaks of day to their wonted seclusion.

1322.—The Cold-River Podargus

(*Podargus humeralis*) This species is a native of New Holland: above, it is variegated with ashy-brown and yellow, the head and sides of the back are conspicuously striped with black, the forehead and dorsal plumage lightly dotted and banded with white The plumage of the under parts is transversely striped with narrow lines of black, on a dirty-yellow ground. Total length, twenty inches.

In the 'Zoological Proceedings' for 1840, p 163, will be found the description of a closely allied but smaller species, under the name of Podargus brachypterus, or Macrorhynchus, which inhabits the district of the Swan River, Western Australia, but without any account of its habits or manners, indeed there is much in the economy of the whole of these strange-looking birds which remains yet to be ascertained.

1323.—The Javanese Podargus

(*Podargus Javanensis*, Horsfield). Chabba-wonno of the Javanese, or Burong saiang: see 'Catalogue of a Collection of Birds from Malaya,' by T. C. Eyton, Esq, 'Zool. Proceeds., 1839,' p. 101. The general colour of this bird is ferruginous or rufous, with a tint of buff yellow, varied by undulating transverse bands of dark brown; a collar of pale yellowish white, variegated with two narrow bands of deep brown, passes round the lower part of the neck, and from this collar several large irregular white marks are disposed in an interrupted series from the root of the wing to the middle of the back; on the breast and under parts several white feathers are scattered The tail, which is rounded, is marked with strong transverse bands, the feet are rufous; the claws blackish, the bill obscure, yellow, and rather shining. Length, nine inches.

This species, which is a native of Java, is of small size compared with the Podargi generally, but it agrees with them in form and style of colouring It tenants the depths of extensive forests, passing the hours of day in sleep, and rousing up on the approach of night to commence its chase of insect prey no further details of its habits have been received.

1324.—The Fork-tailed Goatsucker

(*Psalurus macropterus*) The genus Psalurus closely approaches the genus Caprimulgus in its principal characters the vibrissæ of the bill are strong, the tail is excessively long, and deeply forked.

This singular bird is a native of Paraguay and Brazil· a bright ruddy demi-collar ornaments the back part of the neck, the two external tail feathers in the male are greatly elongated, far surpassing the others, but in the female these feathers are not so excessively produced. The Fork tailed Goatsucker flies with great rapidity, expanding and closing its tail as it skims along It is crepuscular and nocturnal, and, like our Night-jar, gives chase to insects, on which it feeds

1325 The African Long-tailed Night-jar

(*Scotornis climaturus*) In the genus Scotornis the outer toe is shorter than the inner, the vibrissæ of the beak are strong and numerous, the tail is lengthened and graduated

The present species, which is common in Senegal, appears to be larger than it really is, from the great length of the tail, which measures nine inches, of which three inches and a quarter are occasioned by the two middle tail-feathers exceeding the others The vibrissæ are longer than the bill· of the quill-feathers the third is longest The ground colour of the plumage is light ferruginous brown varied with dark freckles. The chin and a stripe from the angle of the gape white, the lesser wing-coverts have at their tips a broad band of white, and the greater have a terminal spot of cream colour much smaller than the former The ground-colour of the five primary quills is entirely black, without any rufous, their tips only being freckled with grey, but they are crossed in the middle by a snowy white broad band beginning in the inner web of the first and terminating on the outer web of the sixth quill, the remaining quills are varied with black and rufous and tipped with white The tail is variegated in the usual manner, the middle pair of feathers having about twenty very slender transverse bars, but much undulated, while the outer margin of the exterior feather and the tips of that and of the next are pure white. No grey in the plumage. Total length, including the tail, thirteen inches.

1326.—The Leona Night-Jar

(*Macrodipteryx Africanus*) Caprimulgus Macrodipterus, Afzelius, C longipennis, Shaw, Pennon-winged Night jar, Long shafted Goatsucker. This curious bird is remarkable for two long elastic shafts issuing from the middle of the wing-coverts, and varying in length from eight or ten to twenty inches, they are tipped with a broad web for three, four, or five inches, and occur only in the male. What may be their use is difficult to imagine. Mr. Swainson ('Birds of Western Africa'), after stating that the female is entirely destitute of these long-shafted or supplementary feathers, proceeds to observe that the fact is important, as "it goes far to prove that they are not essential to the economy of the species, for if otherwise, both sexes would possess them, unless it be contended—a supposition highly improbable—that the male feeds in one manner and the female in another. In the absence of all information on this point, we are led to conclude that they are more ornamental than useful, given to the male sex as attractive decorations to the female, in a similar manner as the flowing feathers of the Paradise-bird are known to distinguish the male sex. In their texture they are remarkably flexible, moving about with the least breath of wind ' The inner web at the end is two inches broad in the middle; the outer web is scarcely half an inch

The Leona Night-jar is a small species, measuring, from bill to end of tail, about eight inches. The wings are long, exceeding the tip of the tail, which latter is even, and consists of ten feathers; the bill is feeble; the vibrissæ strong. The colour of the plumage consists of mingled tints. Upon each web of every primary quill-feather is a row of nine rufous and nine black spots. The secondary quill-feathers are black, with four rufous bands; the middle tail-feathers are grey, speckled with black points, and crossed by six black bars; the outer web of the lateral tail-feather on each side is fulvous white, with about ten black spots at equal distances from each other. Some of the scapulars have a broad cream-coloured stripe, which forms a connected series when the feathers lie over each other. The male has a few obscure white mottles about the throat and ears.

Of the habits of this species nothing is known.

1327.—The Nacunda

(*Proïthera diurna*, Swainson). Caprimulgus diurnus, Wied. The genus Proithera differs from Caprimulgus in the paucity of the vibrissæ round the gape of the beak, in the great length of the wings, the shortness of the tail, and the size and complete nakedness of the tarsi.

The Nacunda is a native of Brazil and Paraguay, and is, to a great extent at least, diurnal in its habits, being seen abroad in cloudy days in flocks of fifteen or twenty, skimming over the ponds in pursuit of insects, precisely in the manner of swallows

The plumage above is a mixture of grey-brown, yellowish red, and brownish black, with great spots of blackish brown, and wide borders of yellowish red The chin is pale yellow, striped with grey brown The tail is marked with brownish black and bright yellow, and crossed by nine or ten transverse bands speckled with brownish black Plumage beneath, white, streaked with grey brown on the chest, below spotless

Family HIRUNDINIDÆ (SWALLOWS)

The present family comprises an extensive and very natural group of birds, distinguished for their powers of flight and insectivorous appetite The limbs are short and comparatively feeble, but the toes are furnished with sharp hooked claws for the purpose of clinging to walls or the sides of rocks In the swifts the toes are all directed forwards In the true swallow the hind toe is reversible, the wings are long and pointed, and the quill feathers of firm texture the general plumage is close set, always smooth, sometimes burnished and glossy the beak is small, depressed, broad at the base, and with a wide gape. The food, consisting of the smaller species of insects, is always taken on the wing, and they often completely fill the throat with their insect prey, so as to distend it like a pouch, doubtless in order that their nestlings may have a full supply at each visit The whole of the active existence of these birds is, in fact, passed upon the wing they skim along with marvellous rapidity quarter their ground over meadows, lakes, and rivers, wheel round barns and steeples, and dash along apparently as untired when evening closes as when they began their aerial evolutions with the first dawn of day They feed and drink on the wing, and pursue each other in sportive chase, performing the most rapid and beautiful evolutions.

The British species of this group are the Chimney-Swallow (Hirundo rustica), the Martin, or Window-Swallow (H urbica), the Sand-martin (H riparia), and the Swift (Cypselus apus) We may add the White bellied Swift of Gibraltar, or Alpine Swift (Cypselus Alpinus), as a rare and accidental visitor. All our swallow tribe are birds of passage, they come in spring, and depart in autumn, winging their way to the south, and passing the winter in Africa, the great rendezvous of the migratory birds of Europe.

Fig 1328 represents a group of British Hirundinidæ, *a*, the Swallow, *b*, the Martin, *c*, the Sand-Martin, *d*, the Swift

1328 (*a*), 1329.—The Swallow

(*Hirundo rustica*). "The swallow," says Sir H. Davy, "is one of my favourite birds, and a rival of the nightingale, for he glads my sense of seeing as much as the other does my sense of hearing. He is the joyous prophet of the year, the harbinger of the best season, he lives a life of enjoyment amongst the loveliest forms of nature; winter is unknown to him, and he leaves the green meadows of England in autumn for the myrtle and orange groves of Italy and for the plains of Africa."

The swallow is too well known to need a very detailed description. It makes its appearance in our island about the middle of April, though sometimes a few stragglers arrive earlier, before the spring has fairly opened: and, as they disappear, should the weather set in cold, we are inclined to suspect that they retrace their passage to a warmer latitude, and return with the great body on their way northwards. Who has not watched the swallow on the wing;

who has not marked its rapid flight, now smoothly skimming along, now executing sudden turns and abrupt and intricate evolutions with astonishing celerity? The swallow delights to quarter the surface of pasture-lands, new-mown meadows, streams, and ponds, attracted by the abundance of insects on which it feeds, a smart snap of its bill, easily distinguishable by an attentive ear, accompanying the capture of its prey. If the weather be warm, it dips in the water as it passes along, and emerges shaking the spray from its burnished plumage uninterrupted in its career.

The swallow breeds twice a year, choosing different situations as they may present themselves: we have known them frequently attach their nest to the inside of tall old chimneys, we have seen them building in barns and outhouses against the beams or rafters, and we well remember a pair or two annually building in a wheelwright's workshop, undisturbed by the noise of hammer, axe, and saw, to the satisfaction of the good man, who left a place open for their entrance and exit when his workshop was shut. Mr Selby says that where coal-pits abound the swallow sometimes fixes its nest against the side of a deserted shaft, a circumstance we have ourselves once or twice noticed. The nest is open at the top, and composed of clay or mud, worked up by a glutinous exudation from the mouth of the bird into a proper consistence. It is lined internally with a bed of feathers. The eggs are five in number, of a white colour, speckled with reddish brown.

"The swallow," says White, "is a delicate songster, and in soft sunny weather sings both perching and flying on trees in a kind of concert and on chimney-tops." Its notes are indeed pleasing, but are hurried and twittering, and are generally uttered at sunrise, when the weather is warm and genial.

The swallow brings out her first brood about the last week in June or the first in July, and her second brood towards the middle and end of August. During the month of September the young of the last incubation have acquired full strength of wing, and at the end of that month, or in the beginning of October, the great migratory movement southwards commences. Multitudes from various quarters now congregate together and perch at night in clusters on trees, barns, house-tops, but especially among the reed-beds of marshes and fens, round which as evening draws on, they may be observed wheeling and skimming, now sinking, now rising and wheeling again, all the while uttering their garrulous concert, till, as

> 'Evening draws o'er all
> Her grey and dusky veil,'

they finally settle down and all is quiet and silent. It is strange that so excellent an observer of nature as Gilbert White should have entertained the opinion that swallows hybernate submerged in marshes or secreted in holes and caverns like bats, and the more so as the ancients were well aware of their migratory movements, and of their winter residence in Africa.

It is a remarkable circumstance in the history of our Hirundinidæ, that they return annually to the same place, and resume and repair their old nests, or, if they have been destroyed, build others in their stead; but the question arises, is not this to a greater or less extent the same with all our summer visitors? Do they not return to their old haunts, and if they do not repair their nests, which are always spoiled by the winter's rains and snows, do they not return to the same hedge-row, the same copse, the same garden? Even with respect to non-migratory birds we think we have observed a tendency to build in the vicinity of their former nest, especially if unmolested; indeed, in the case of the hedge sparrow (Accentor modularis) we have reason from personal experience, to believe it to be so.

The swallow is very assiduous in the nurture of her young. She leads them, as soon as they are able to leave the nest, to the ridge of the barn or house-top, where, settled in a row, and as yet unable to exert their pinions in flight, she supplies them assiduously with food. In a few days they begin to trust to their wings, and follow their parents, who feed them during their aerial evolutions; but in a little time they depend on their own exertions.

The forked character of the tail easily distinguishes the swallow from the rest of our British Hirundinidæ. The forehead and throat are rich chestnut, the whole of the upper surface and the breast are black with reflexions of steel blue and purple; a white spot on the inner web of all the tail-feathers except the two middle. Under surface white with a wash of reddish brown.

1330.—The Swallow of Palestine.

The common swallow appears to have a most extensive range; not only does it visit Europe, but Asia Minor, Palestine, and the adjacent country, and in the earliest times its habits of regular migration were observed and understood; hence the expression:—"The stork in the heaven knoweth her appointed times, and the turtle and the crane and the swallow observe the time of their coming," (Jeremiah viii. 7). From a passage in Aristophanes we learn that among the Greeks the arrival of the crane pointed out the time of sowing, that of the kite the time of sheep-shearing, and that of the swallow the time to put on summer clothes. According to the Greek Calendar of Flora, kept by Theophrastus at Athens, the ornithian winds blow and the swallow comes between the 28th of February and the 12th of March.

1331.—The Cliff Swallow.

(*Hirundo fulva*). The Republican Swallow of Audubon. This elegant species is a native of the western parts of the United States of America, and it is only recently, comparatively speaking, that it has ventured within the domains of civilized man. Already, however, it is familiar in different localities of Ohio and Kentucky, and has more recently appeared in the western part of New York. Like all the other American swallows it passes the winter in tropical America, and arrives at its northern breeding-places in April. This species is gregarious in its habits, and numbers construct their symmetrical nests in clusters as seen in Fig. 1331. At the dawn of day they commence their labours, collecting the mud of which the exterior is formed, and persevere in their work until near midday, when they relinquish it for some hours, employing the time in the capture of insects and in aerial gambols. In unsettled countries these birds avail themselves of the sides of rocks under the shelter of overhanging ledges; but in civilized districts they have already evinced a predilection for the abodes of man, building against the walls of houses under the eaves of the roof, though they have not in the least changed their style of architecture. The nest is hemispherical, five inches in diameter at its attachment to the wall, from which it projects six inches, having the entrance at the end of a short neck-like projection somewhat turned downwards. It is lined with dried grass and straw. The whole is completed in three or four days. The cliff swallow is more closely related to our martin in form, habits, and manners than to our chimney swallow; it is active and rapid, feeding on the wing. Its note is peculiar, and may be imitated by rubbing a moistened cork around the neck of a bottle.

This swallow is characterized by its even tail. Instead of having the lower part of the back white like our window swallow or martin, it is of a pale ferruginous tint, as is also the forehead; a narrow black line extends over the bill to each eye; the upper parts generally are glossy violet black; the breast is pale rufous ash colour; the under parts dirty white. Length five inches and a half. Eggs, four in number, white spotted with dusky brown.

1332.—The American Barn Swallow.

(*Hirundo rufa*). This species is the representative of our chimney swallow in the United States of America, and is a universal favourite. It builds in barns and outhouses, but never in chimneys. It is very customary to fit up boxes for it to nestle in, and the country people have a superstitious idea that if they permit the swallows to be shot their cows will give bloody milk, and moreover that the barn they tenant will never be struck with lightning: so at least was Wilson assured, who adds, 'I nodded assent, for when the tenets of superstition lean to the side of humanity one can readily respect them.'

'Early in May,' says this admirable writer, 'they begin to build. From the size and structure of the nest it is nearly a week before it is completely finished. It is in the form of an inverted cone with a perpendicular section cut off on that side by which it adheres to the rafter; at the top it has an extension of the edge or an offset, for the male or female to sit on occasionally; the upper diameter is about six inches by five, the height externally seven inches. This shell is formed with mud mixed with fine hay, as plasterers do mortar with hair to make it adhere the better; the mud seems to be placed in regular layers from side to side; the shell is about an inch in thickness, and the hollow of the cone is filled with fine hay well stuffed in, and above that is laid a handful of downy feathers. Though it is not uncommon for twenty or even thirty to build in the same barn, yet everything seems conducted with great order and affection; all seems harmony among them, as if the interest of each were that of all. Several nests are often within a few inches of each other, yet no appearance of discord or quarrelling takes place in this peaceful and affectionate community." They have generally two broods in the season. The male twitters with great sprightliness, and thus cheers his mate during her task of incubation. The flight of this species is rapid and circuitous, and varied by the most complicated and zigzag evolutions. The American barn-swallow differs from our European swallow in having the under parts and the lining of the wing of a bright chestnut in the male, and of a rufous white tint in the female. Length, seven inches.

1328 (b).—The Martin, or Window-Swallow.

(*Hirundo urbica*). Who is not acquainted with this elegant little bird, and with its clay-built nest, the "pendent bed and procreant cradle," which it makes under the eaves of our houses? It is the temple-haunting martlet of Shakespeare, the guest of summer, that

> ———————"does approve
> By his loved mansionry that the heaven's breath
> Smells wooingly."

The martin, or as White calls it, the house-martin, usually appears a few days later than the swallow, repairing to its old quarters, where, after examining the shell of its nest, it gives some time to play, sporting and gambolling, and chasing its insect food. Towards the middle of May it sets itself seriously to work in restoring the dilapidated tenement, or constructing a new one. The crust or shell is made of clay or mud, tempered with glutinous saliva, and lined with straws, grass, and feathers. The eggs are from three to five, and of a pinkish-white. We may often observe rows of these clay-built homesteads under the eaves of barns or farm-houses, and it is interesting to see two or three little heads peeping out of each, watching their parents as they wing their way, and dash by in pursuit of insects, or querulously receiving the food which, arresting their career for an instant, their parents bring them. During the season of incubation the male utters his soft guttural song, sometimes while on the wing, sometimes while clinging to the nest or even in it, as if to cheer his faithful mate, patient in her appointed duties. Two broods are generally produced every year, the first leaving the nest in July, the second in August or the beginning of September.

The flight of the martin differs from that of the swallow, in being more smooth and uniform, with fewer and less abrupt turns and evolutions; it is very rapid, but scarcely so much so as in the latter species.

Towards the end of September, and at the beginning of October, martins assemble in multitudes, day after day increasing their numbers, till at last they swarm in myriads, the air appearing crowded with them, and the roofs of barns and houses and the larger branches of the trees literally covered by them. This reunion is preparatory to their departure, which takes place towards the end of the month, flock after flock leaving, till, by the 6th or 8th of November all have disappeared. The martin is distinguished by the less forked character of the tail, and by the pure white of the rump, breast, and under surface. The head, back, and wings are purplish black. The tarsi are covered with white down to the very claws.

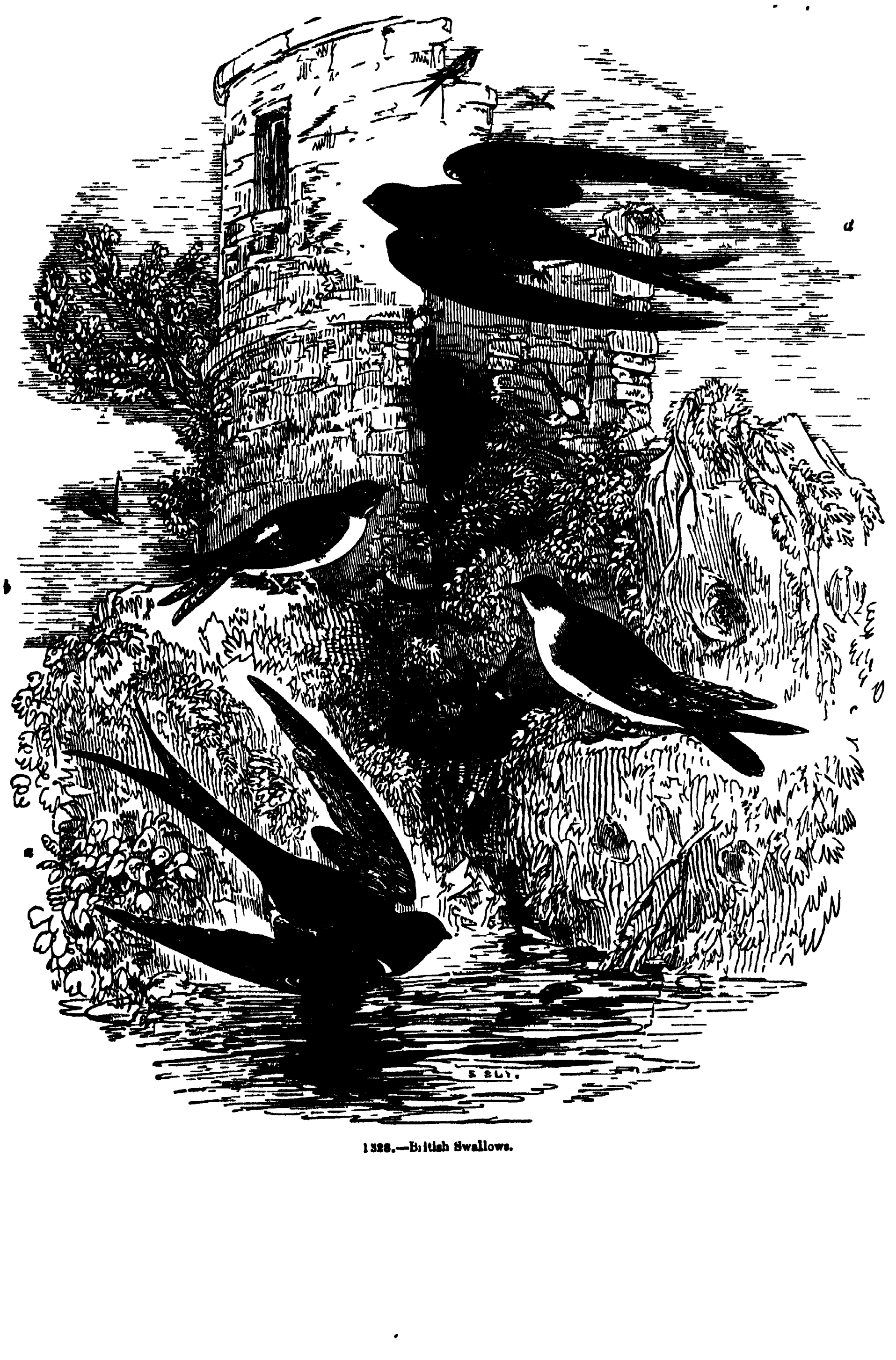
1328 (c).—The Sand Martin.

(*Hirundo riparia*). The sand martin, or bank swallow, is the smallest of our British Hirundinidæ, but it certainly makes its appearance the earliest, often about the end of March. Its flight is less impetuous than that either of the swallow or house martin, and more vacillating, though still brisk and animated. In Spain, from the manner in which it flies, this species is called by the country people the mountain butterfly (Papillon de Montagne), and it is sold in the markets at Valencia for the table. It is fond of skimming over the surface of water and flat heaths and commons. Seventy years ago White says, "Some few sand martins, I see, haunt the skirts of London, frequenting the dirty pools in St George's Fields and about Whitechapel;" and we ourselves have seen them in flocks over the Serpentine in Hyde Park. The query is, where do these individuals make their nests? for unlike the swallow or martin, this species bores with its bill deep holes in abrupt precipitous sand banks, at the extremity of which it makes an inartificial nest of hay, straw, and feathers. A convenient spot is often colonized by scores of these birds, we may say hundreds; we have seen steep sand cliffs in Cheshire and other places, especially if overhanging a rivulet, loop-holed by their burrows in the most extraordinary manner and in close array; and Professor Pallas says that on the high banks of the Irtish their nests are in some places so numerous that when disturbed the inmates come out in vast flocks and fill the air like flies. These burrows are sometimes three feet in depth, and more or less tortuous; and it is surprising that so small a bird should be so efficient a miner. Its beak, however, (see Fig. 1333) instead of being soft and tender as White describes it, is uncommonly hard and sharp, and well calculated for working on the loose-textured material subjected to its action. The bird clings

1335.—Head and Foot of Swift.

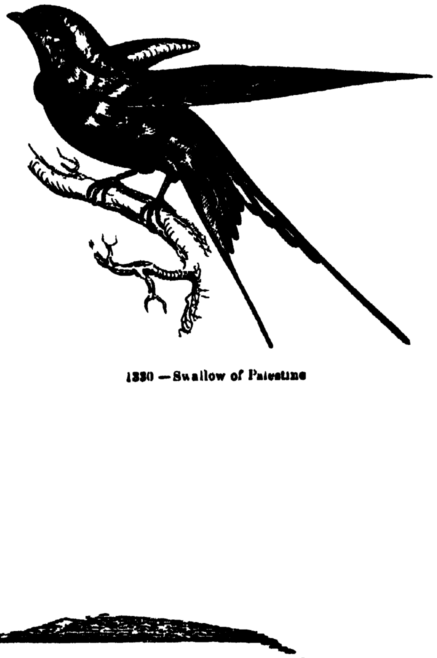
1333.—Head of Bank Swallow.

1336.—Head and Foot of Large-winged Swallow



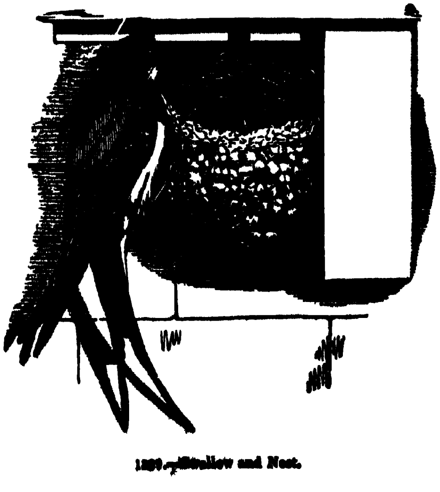
1328.—British Swallows.

1332.—American Barn Swallow



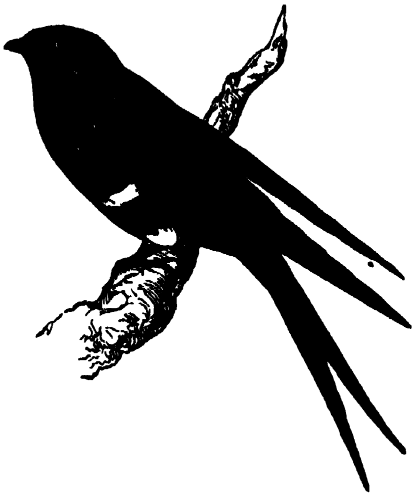
1330.—Swallow of Palestine

1331.—Nests of the Cliff-Swallow.

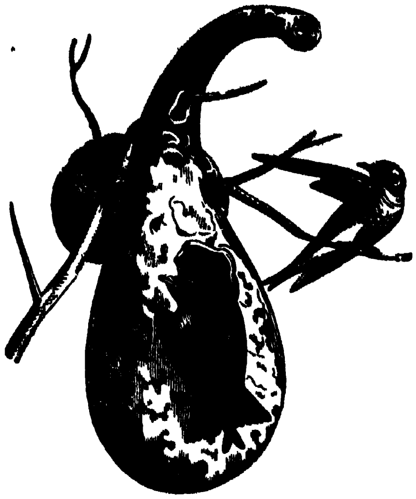


1329.—Swallow and Nest.

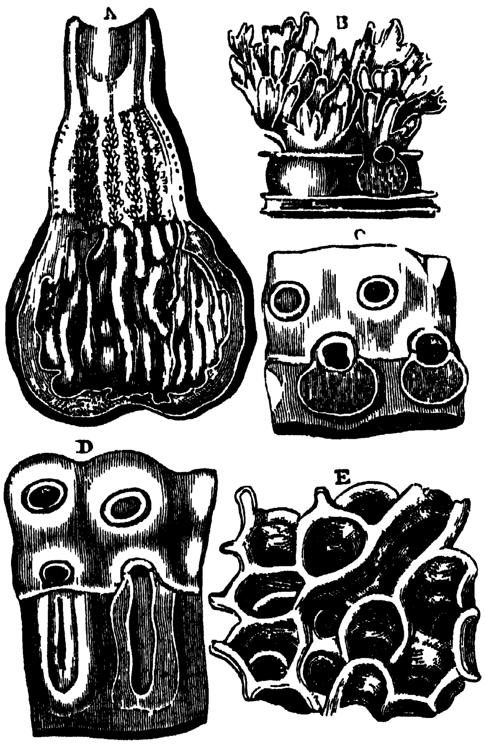
1341.—Esculent Swallow and Nest.



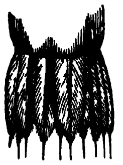
1339.—White banded Swallow



.334 —Purple Martins and Nest.



1342.—Glands of Stomach in Birds.



1338.—Tail of Long winged Swift.

1343.—Green Todies.

1344.—Javanese Eurylaimus.

1337.—Long-winged Swift.

Swallow and Nest.

with its claws to the face of the cliff, and pegs away with its miniature pickaxe, making greater progress than could be expected; as it proceeds, it scrapes out with its feet the sand detached by its bill, and so continues its labours till the requisite depth is attained.

This species is decidedly gregarious, and may be seen flying about, not only in company with others of its own species, but with swallows and martins, busy in the chase of prey. It probably breeds twice if not thrice in the season. The general colour of this species is mouse brown above, white beneath. The eggs, five in number, are white.

1334.—THE PURPLE MARTIN

(*Hirundo purpurea*). This well-known bird, says Wilson, "is a general inhabitant of the United States (of America), and a particular favourite wherever he takes up his abode." It arrives in the southern frontiers late in February or early in March, reaches Pennsylvania about the first of April, and extends its migrations as far north as the country round Hudson's Bay, where it is first seen in May and disappears in August.

"The summer residence of this agreeable bird is universally among the habitations of man, who, having no interest in his destruction, and deriving considerable advantage as well as amusement from his company, is generally his friend and protector. Wherever he comes he finds some hospitable retreat fitted up for his accommodation and that of his young, either in the projecting wooden cornice, on the top of the roof, or sign-post, in the box appropriated to the blue-bird (Saxicola sialis); or, if all these be wanting, in the dove-cot, among the pigeons. In this last case he sometimes takes possession of one tier of the premises, in which not a pigeon dare for a moment set its foot. Some people have large conveniences formed for the martins, with many apartments, which are usually fully tenanted and occupied every spring; and in such places particular individuals have been known to return to the same box for several successive years. Even the solitary Indian seems to have a particular respect for this bird. The Chactaws and Chickasaws cut off all the top branches from a sapling near their cabins, leaving the prongs a foot or two in length, on each of which they hang a gourd or calabash, properly hollowed out for their convenience. (See Fig. 1334.) On the banks of the Mississippi the negroes stick up long canes with the same species of apartment fixed to their tops, in which the martins regularly breed. Wherever I have travelled in this country, I have with pleasure seen the hospitality of the inhabitants to this favourite bird."

The purple martin is the terror of crows, hawks, and eagles, uniting with the king-bird in attacking them; and so well is this known to the lesser birds and to the domestic poultry, that as soon as they hear the martin's voice engaged in fight, all is confusion.

"To observe with what spirit and audacity this bird sweeps round the hawk or the eagle is astonishing. He also bestows an occasional bastinading on the king-bird, when he finds him too near his premises, though he will at any time instantly cooperate with him in attacking the common enemy."

The flight of this bird is remarkably graceful, easy, and rapid; he darts along with the swiftness of an arrow, and wheels and turns with the most surprising address. His usual note is loud and musical, resembling the syllables "*peuo-peuo-peuo*," but is frequently succeeded by others more low and guttural. Most of the swallow tribe feed upon the smaller insects. This species, on the contrary, preys on wasps, bees, and even large beetles, as goldsmiths (Cetonia), &c., which are swallowed whole."

"At the approaching dawn," says Nuttall, "the merry martin begins his lively twitter, which, continuing for half a minute, subsides until the twilight is fairly broken. To this prelude succeeds an animated and incessant musical chattering, sufficient, near the dwelling, to awaken the soundest sleeper. His early vigils are scarcely exceeded by the domestic cock: the industrious farmer hears the pleasing call to labour, and associates with the favourite bird the idea of an economical, cheerful, and useful guest. In the middle States, from the 15th to the 20th of April, the martins begin to prepare their nest, which is usually made of small green or dry leaves, straws, hay and feathers, laid in considerable quantities. The eggs, pure white, are from four to six, and without spots. They rear two broods in the season. Several pairs also dwell harmoniously in the same box. The male, very attentive to his sitting mate, also takes part in the task of incubation; and his notes at this time have apparently a peculiar and expressive tenderness."

The male purple martin is dark bluish glossy purple: the wings and forked tail are brownish black. The female and young are bluish brown, and have the belly whitish. Tail considerably forked. Length, about eight inches. Alar extent, sixteen.

1328 (*d*).—THE SWIFT

(*Cypselus Apus*). Cypselus murarius, Temminck; Hirundo Apus, Linnæus; Provincial, Screech, Develing, Black Martin, Screamer, Squeeler; Moutardier, Martelet, Martinet Noir, ou Grand Martinet, of the French; Rondone, Dini, and Dardano of the Italians; Ring-swala of the Swedes; Thurm Schwalbe of the Germans; Gier Zwaluw of the Netherlanders; Martin dû of the antient British.

In the genus Cypselus the tarsi are thickly feathered; all the four toes are directed forwards, the two middle are equal. (See Fig. 1335, the Head and Foot of the Swift.)

This species is the largest of our British Hirundinidæ, but its weight is proportionately small to its extent of wing; the former being scarcely one ounce, the latter measuring eighteen inches. Length, eight inches.

From its form, the swift is the most rapid in its flight of our swallow tribe; the air is its home. On the ground, from the shortness of its tarsi, it can only crawl; and from the length of its wings, unless it avails itself of some trifling elevation, it finds difficulty in rising and does not succeed until after one or two trials. On the ground, however, the swift never willingly settles. Its feet, armed with sharp curved claws, are admirably adapted for clinging to the slightest roughness on the surface of rocks or towers, in the dark crevices of which it rears its young. The swift is the latest of its tribe to visit us, and the earliest to depart, appearing about the middle of April and retiring southwards in August; and rearing only one brood.

There are few village steeples round which these birds may not be seen wheeling and screaming during the fine evenings and mornings of June and July, now soaring aloft, now dashing round the angles of the building with astonishing address and velocity. It is interesting to watch them; on the wing they feed—they drink—they collect the materials of their nests—and enjoy the pleasures of existence. From dawn, till darkness commences, are they thus engaged, excepting the females, brooding over their eggs in darkness: these are ever and anon visited by their mates, who wing their way repeatedly close past the crevices where the nests are placed, uttering a scream as they glide by, which is answered by a low murmur of complacency.

The nest of the swift is composed of dry grass and light straws, interwoven and held together by a viscous substance; and lined with feathers, silk, and linen threads, skimmed from the ground during flight. The eggs are white, and from two to four in number. When the female, says White, has sat hard all day, she rushes forth just as it is dusk, relieves her weary limbs, snatches a scanty meal, and returns to her work of incubation. The same writer notices the pouch full of insects under the tongue, which, when these birds are wantonly shot, is usually discovered. It is in this way that all our British swallows store up food for their young.

In Derbyshire, the swift, the swallow, and the martin, haunt the precipitous rocks of limestone, and there build and breed, as we have abundantly experienced. The swift, short as is its stay in these latitudes, is spread over the greater part of Europe. It visits Lapland, Norway, Denmark, and Sweden; in which last country Professor Nilsson states that it makes its nest in hollows of trees in the woods. Its eastward range appears to be as far as the mountain-lake Baikal. At Erzerum it has been observed in numbers from May till September. Mr. Yarrell states that he has never seen this species in any collection brought from India. It has been noted at Madeira. Montagu extends its southward range in Africa as far as the Cape: Temminck limits it to the tropics. In our own country it has been remarked that swifts are less plentiful with us than they formerly were.

With the exception of the throat, which is dusky grey, the plumage is sooty black with a greenish tinge. The tail is forked. The plumage is close and firm.

1336.—THE LARGE-WINGED SWALLOW

(*Macropteryx longipennis*, Swainson). Head and Foot. Generic characters:—Tarsus remarkably short and naked; anterior toes long, and nearly equal; hinder toe very short. Tail long and forked. Locality, India.

The present species, given as an example of the genus Macropteryx, is of an obscure glossy green above; the throat, breast, and lower part of the back light grey; belly, spot on the scapulars, and line over the eye, white; ears rufous; front with an incumbent crest.

Mr. Swainson, whose description this is, and who has given an elegant figure of the bird in the second series of his 'Zoological Illustrations,' inquires whether the Hirundo Klecho of Dr. Horsfield (Sambor-galeng of the Javanese), which is described by the doctor in the 13th vol. of 'Linn. Trans.' as eight inches and a half in length, is not the female of this species. Mr. Swainson considers Macropteryx intermediate between the typical swifts and the swallows. To the first, he remarks, it is allied by its strong scansorial feet; to the latter by the length and fixed position of the hind toe, and the depression of the bill.

1337.—THE LONG-WINGED SWIFT

(*Chætura macroptera*). Generic characters:—Feet as in Macropteryx; but the tarsus longer than the middle toe. Tail short and even, with the shafts prolonged into acute points. (See Fig. 1338.)

The long-winged swift is brown, with the wings and tail glossed with greenish blue, the back being of a grey white, the chin and under tail-coverts snowy; the tail is even. This species and the Hirundo albicollis are two of the largest species yet discovered of a very singular group of swifts which have the tail-feathers spined, and even more rigid than those of the wood-peckers; by this structure, as Mr. Swainson remarks, the birds can remain for a considerable time in the most perpendicular situations. The expanded tail, he adds, thus acts as a powerful support, which is further increased by the size and strength of the claws, these last being much larger than those of ordinary swallows. Most of the species are natives of America, but Mr. Swainson does not say whether this is a native of that country.

1339.—THE WHITE-BANDED SWALLOW

(*Hirundo fasciata*). Hirondelle à ceinture blanche, Buffon. This bird, which is extremely rare, is a native of South America. According to Buffon it is sometimes seen perched on floating trees in the rivers of Guiana, but of its habits and nidification we have no details.

340.—THE SALANGANE, OR ESCULENT SWALLOW

(*Hirundo esculenta*). Lawet of the Javanese.

1341.—THE LINCHI

(*Hirundo fuciphaga*). Linchi of the Javanese. These two species, with others not clearly defined, are the constructors of those singular nests which are prized as luxuries by the Chinese, and form so considerable an article of commerce.

The Lawet is brown above, whitish beneath, and at the end of the tail, which is forked. The Linchi is rather smaller than the former, being about five inches long; its under parts are white, and its wings are longer in proportion. Specimens of both these birds are in the Museum of the East India Company.

Much has been written about these birds and their nests, till, from clashing opinions, the subject has become involved in difficulty. According to Lamouroux, there are three species which make edible nests, the most valuable being those of the smallest species, which he states is distinguished by the feet not being covered with down; it is never found inland, but always on the sea-coast. The nest is clear and white, and composed, as he believes, of sea-plants of an order termed by him Gelidia, which by boiling or steeping in water may be almost wholly reduced to jelly. Others consider the nest as a sort of fish-spawn; others as composed of inspissated sea-foam, or the juice of a tree; and others of molluscous animals.

To give an idea of these nests, several of which, varying in clearness of composition, we have examined, we may describe them as resembling in form that of the chimney-swallow, being concave, shallow, and lined with feathers; but the crust or shell, instead of being made of clay, is something in appearance like fine manna as sold at the druggist's shops, approximating, however, to coarse isinglass. Sir G. Staunton says:—"In the Cass, a small island of Sumatra, we found two caverns running horizontally into the side of the rock, and in these were a number of those birds'-nests so much prized by the Chinese epicures. They seemed to be composed of fine filaments cemented together by a transparent viscous matter, not unlike what is left by the sea upon stones alternately covered by the tide, or those gelatinous animal substances found floating on every coast. The nests adhere to each other, and to the sides of the cavern, mostly in horizontal rows, without any break or interruption, and at different depths from fifty to five hundred feet. The same sort of nests are also said to be found in the deep caverns at the foot of the highest mountains in the middle of Java, at a distance from the sea." "The value of these nests is chiefly ascertained by the uniform fineness and delicacy of their texture, those that are white and transparent being most esteemed, and fetching often in China their weight in silver."

Montbeillard, who in 1741 visited the straits of Sunda near Java, and went ashore on an islet called the Little Toque, discovered a deep cavern in the rocks on the brink of the sea, the mouth of which was darkened by multitudes of swallows pouring out in swarms, and the roof of the cavern was covered with their nests. He describes them as softening in water, and as composed of fish-spawn, resembling half-melted glue which floats on the sea, and adds, "sometimes threads of this viscous substance are seen hanging to the bills of these birds, and which have been supposed, without foundation, to be extracted from the stomach in the breeding-season." It was perhaps this passage that induced Sir E. Home to examine the gastric glands of a species of swallow of very large size, and which he regarded as the edible swallow, brought from Java by Sir T. S. Raffles In this species he found the gastric glands projecting, and splitting into several portions like the petals of a flower, and argues that their development is to supply a secretion for the formation of the nests. Fig 1342 shows :—A, the gullet and gizzard of the Java swallow laid open; B, the gastric glands magnified two hundred and twenty-five times; C, the same glands in the common swallow; D, the same glands in the blackbird, E, similar glands in the pylorus of the human stomach, magnified nine hundred times. Against the inference of Sir E. Home it is objected, and with force, that it does not appear that the swallow he examined (double the size of our swallow) was one of the edible species, and that we have not the shadow of proof from analogy to conclude that these gastric glands, for whatever reason they might be developed, secrete the materials of the nest. The most probable theory is, that whatever else may be used, the bird, as is the case with the swallow and swift, employs a viscid saliva as a cementing medium; as M. Reinwardt, a celebrated professor, who resided a considerable time in Java, and made some careful researches upon the subject, came to the conclusion that the bird consolidates, if it does not wholly form, its nest with a viscous and glutinous fluid, secreted by its very large parotid (salivary) glands. Mr Crawford, late British resident at the court of the Sultan of Java, and who superintended the collection of these nests (for they are claimed as royal property, and form a valuable branch of the revenue of the state) at Karang-Bolang for several years, has given us an interesting commercial history of them too long to be quoted We may observe, however, that about twenty-seven thousand pounds, the chief part of the best quality, are annually exported from Java but a still greater quantity from the Suluk Archipelago, that much is also exported from Ceylon and New Guinea, and that altogether about thirty thousand tons of Chinese shipping are engaged in the traffic, freighted with property worth in the Archipelago 284 290*l* The danger attendant upon the collecting of the nests in the awful caverns is described as imminent in the extreme.

Family TODIDÆ, Vigors (THE TODIES)

The Todies are characterized by a peculiar flatness or depression of the bill, which has a wide gape margined with vibrissæ. The breadth varies in some (as the Eurylaimi) it is very broad, somewhat resembling the bill of the Podargi, with a boat-like upper mandible. The wings are rounded, the tarsi of moderate length, the two outer toes are united as far as the last joint. The habits of these birds are little known.

1343.—The Green Tody

(*Todus viridis*). Generic characters —Bill lengthened; broad throughout, suddenly contracting at the tip; very flat. Vibrissæ few and weak, tail short, tarsi weak; toes short. Locality, Tropical America.

The green tody inhabits the islands of Jamaica, Hayti, and others. It is said to be a bird of recluse habits, haunting the borders of retired marshes, and, as Sloane says, "melancholy places," sitting with its head crouched between its shoulders; and suffering itself to be approached within a few feet, and gazed at for minutes together before it will move. "It keeps much about houses in the country parts, flies very low, and probably may be easily tamed" These birds, says Lesson, live upon insects which they catch in the mud or the water; "they are in truth water *moucherolles*, and their wide and flattened bill, furnished with asperities, or teeth, permit them to sift the mud and retain the prey: they also seek for small insects under the moss or on the banks of rivulets." The nest is built on the ground, of cotton down, feathers, moss, and other soft materials; the eggs are five in number and of a blue colour. This little bird, which does not much exceed a wren in size, is of a fine bright green above, whitish beneath; the throat is scarlet; the sides rosy; the under tail-coverts yellow.

1344.—The Javanese Eurylaimus

(*Eurylaimus Javanicus*). Generic characters:—Bill broader than the head; under mandible very thin; nostrils basal, transverse, oval; wings rounded: tail rounded. Fig. 1345 displays the characters of the bill and feet in this genus, which is restricted to India and the Indian Archipelago.

The Javanese Eurylaimus is a native of Java and Sumatra; it frequents the banks of rivers and lakes, feeding on insects and worms. It builds its nest pendent from the branch of a tree which overhangs the water. In Java it tenants the most remote and inaccessible wastes covered with extensive forests and abounding with rivers and marshes. General colour, rich vinous purple, forehead black; back of the neck brown; wings blackish brown, with a yellow streak between the coverts and secondaries; and bordered with yellow, which extends underneath the shoulders. Tail-coverts black, with yellow tips, tail-feathers black, with a white mark, the two middle excepted. Bill irregularly variegated and striped: the ridge yellowish; the edges black. Tarsi dusky yellowish.

Family HALCYONIDÆ (KINGFISHERS).

In this family are included several genera which differ much in their habits and modes of life, some resembling our well-known kingfisher in the metallic brilliancy of their plumage, as well as in their darting upon fishes, which constitute their food; others again, with a fuller and less glossy plumage, feeding on reptiles, insects, and small quadrupeds, and never plunging into the water after prey

Varying in minor details, all present the following characters —the beak is lengthened and pointed, the tarsi are short, the toes feeble, and the outer and middle are united as far as the last joint. In some there are only two anterior toes, the innermost being deficient

We shall not enter into the minutiæ of subgeneric details, but proceed to illustrate the family by a few observations on our pictorial specimens, which will convey a clearer idea of the various forms it includes than a dry disquisition on the slight differential characters which guide the naturalist in his subdivisions.

1346—The Gigantic Kingfisher

(*Dacelo gigantea*). This remarkable bird (one of the aberrant forms of the family) is a native of New Holland The plumage is full and soft, and the feathers of the head are elongated into a crest The bill is large, long, powerful, and swollen at the sides the edge of the upper mandible is bowed in near the point, which latter is acute and bends over the point of the lower mandible The tarsi are stout, the toes armed with sharp claws, the wings are rather long, advancing when folded half way down the tail—this is long, broad, and somewhat rounded The eyes have a forward situation, being placed close to the base of the beak, imparting a sharp, cunning, and even fierce expression to the aspect, and well depicting the disposition of the bird, which is daring and rapacious Among the wooded mountain districts in many parts of Australia, and especially those which border the Murrumbidgee river, this species is very common, and may be observed sitting on the watch for its prey, which consists of insects, small quadrupeds, and reptiles Ever and anon it breaks out into a singular abrupt *laugh*, somewhat resembling the syllables *yah-yah yah*, commencing in a low and gradually rising to a high and loud tone, startling when heard amidst the solitudes of the woods From this wild and discordant cry it has obtained from the colonists the title of the "laughing or feathered jackass" The natives at Yas call it *gobera* or *gogobera* One seldom *laughs* without being answered by a second, and among diurnal birds it is the first which is heard in the morning, and the last at the close of evening, it rises with the dawn, when the woods re-echo with its gurgling *laugh*, and at sunset they are heard again in dissonant chorus

Unqualified for plunging in the stream, this bird is vigilant in the pursuit of reptiles and insects Snakes are a favourite food, and it may often be seen flying to a tree with one of these reptiles in its beak, holding it just behind the head Generally the snake is killed before being carried away, but sometimes the bird is observed on the branch to break the reptile's head to pieces with its strong sharp beak Occasionally, as it is asserted, the gigantic kingfisher will kill young chickens, and carry away eggs, but its services in destroying reptiles compensate the settler for these petty depredations. We have seen a specimen of this bird in captivity: generally it sat quietly on its perch, earnestly watching all around it, and now and then uttering its abrupt laugh; on food being presented, it became highly excited, traversed its cage, repeatedly exerting its voice, and manifesting by every action the utmost eagerness and spirit. The general colour above is olive brown: beneath whitish, with obscure dusky bars on the breast; top of the crest brown; a white belt above each eye goes round the occiput; and a broad white collar extends from the throat over the sides of the neck; the tail banded with black and ferruginous white at the tip. Total length, one foot six inches.

1347.—The Cinnamon Crab-eater

(*Halcyon cinnamomina*, Sw.). This species is a native of New Zealand. The general plumage is of a delicate fawn-colour; the wings and tail changeable blue-green; ear-feathers sea green, whence a narrow black line extends round the back of the neck. Total length, ten inches. Of its habits we have no precise details.

1348.—The Belted Kingfisher

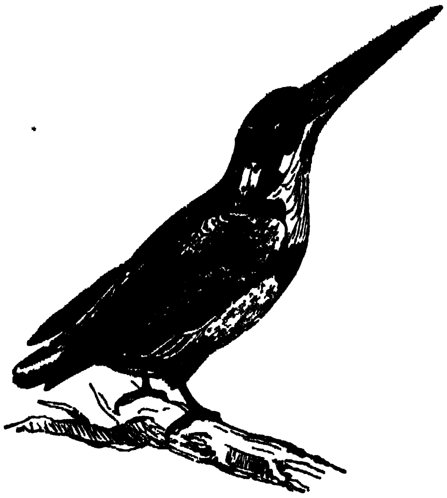
(*Alcedo Alcyon*, Linn). The Belted Kingfisher is a native of America, from Hudson's Bay to Mexico, and is a constant resident in the states of Louisiana, Mississippi, Arkansas, and all the districts that lie to the South of North Carolina, whence it migrates southwards during severe winters The flight of this bird is very rapid, and in the course of its excursions, if it passes over a pool, it suddenly checks itself in its career, poises in the air like a kestrel, and inspects the water beneath, watching the movements of the fishes, it then dashes spirally down headlong into the water, seizes a fish, and alights on the nearest tree or stump, where it swallows its prey in a moment. Wilson states that this bird delights in murmuring streams and falling waters, "not merely that they may soothe his ear, but for a gratification somewhat more substantial. Amidst the roar of the cataract, or over the foam of a torrent, he sits perched upon an overhanging bough, glancing his piercing eye in every direction below for his scaly prey, which, with a sudden circular plunge, he sweeps from their native element, and swallows in an instant His voice, which is not unlike the twirling of a watchman's rattle, is naturally loud, harsh, and sudden, but is softened by the sound of the brawling streams and cascades among which he generally rambles." "Mill dams are particularly visited by this feathered fisher, and the sound of his pipe is as well known to the miller as the rattling of his own hopper. Rapid streams, with high perpendicular banks, particularly if they be of a hard, clayey, or sandy mixture, are also the favourite places of resort for this bird, not only because in such places the small fish are more exposed to view, but because those steep and dry banks are the chosen situation of his nest. Into these he digs with his bill and claws, sometimes to the extent of four or five feet" The extremity is made capacious, and here, on a few sticks and feathers, the eggs are deposited, five in number, and of a pure white The parents are very attentive to their young, and the female employs various artifices to draw the intruder from her brood. The same excavation is used by the same pair year after year in succession.

The plumage of this bird is close and compact. General colour above, light blue, the shaft of each feather blackish, a white spot before the eye, and a streak of the same below it, quill feathers brownish black, barred with white, secondaries blue on the outer web. Two middle tail feathers blue, the rest brownish black barred with white, a broad collar of white from the throat over the sides of the neck, a blue band across the breast, sides mottled with blue, under parts white Total length twelve inches and a half The feathers of the head are long, narrow, and pointed, and form a crest capable of being elevated and depressed

1349, 1350—The Common Kingfisher

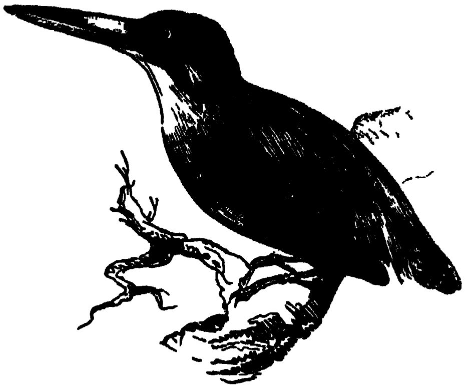
(*Alcedo Ispida*) This is the Martin-Pêcheur of the French, and also Pescheur, Martinet Pescheur, Tartarin, Artre, and Mounier, according to Belon; Piumbino, Ucello del Paradiso Pescatore, Pescatore del Re, Martino Pescatore, Ucello di Santa Maria, and Vitriolo of the Italians, according to Belon, Ucello della Madonna, Ucello Santa Maria, Piombino, and Alcione of the same, according to the Prince of Musignano. Gemeine Eisvogel (Bechstein) and Grosser Kleiner und Fremder Eisvogel (Brehm) of the Germans; Glas y dorlan of the ancient British.

The kingfisher is common in most parts of Europe, and there are few of our streams and rivers flowing through fertile meads, abounding with fish, over which this beautiful but voracious bird may not be seen glancing backwards and forwards, its metallic hues glittering in the sun. Occasionally it hovers at a moderate elevation over the water, and then darts down with astonishing velocity and suddenness on some unwary fish, which, heedless of its foe, ventures near the surface, and which is seldom missed by the keen eyed bird. The ordinary manner, however, in which the kingfisher captures its finny prey is by remaining quietly perched on some stump or branch overhanging the water, and then intently watching with dogged perseverance for the favourable moment in which to make its plunge; it marks the shoals of minnows gliding



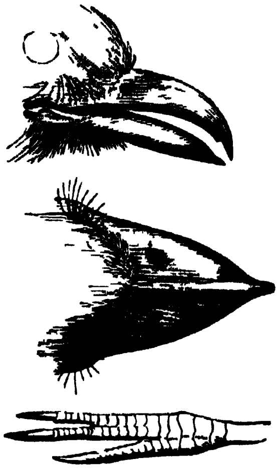
1350.—Burung biru.

1351.—Sacred Kingfisher



1349.—Common Kingfisher

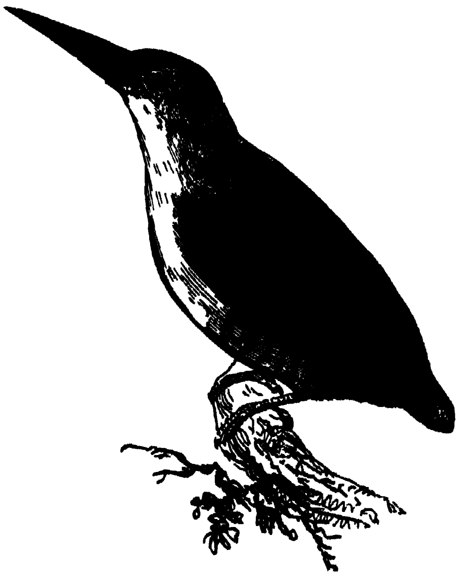
1346.—Gigantic Kingfisher



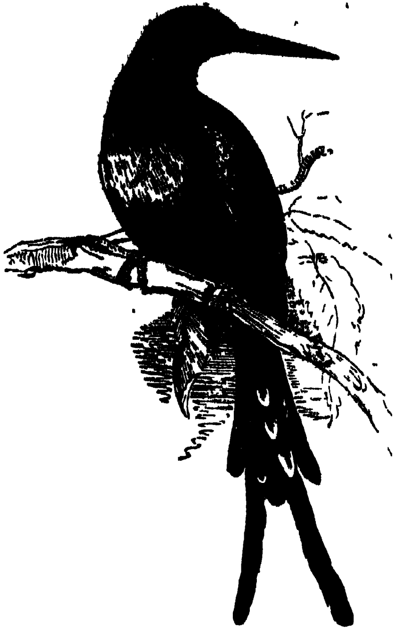
1345.—Bill and Foot of Eurylaimus

1 Kingfisher

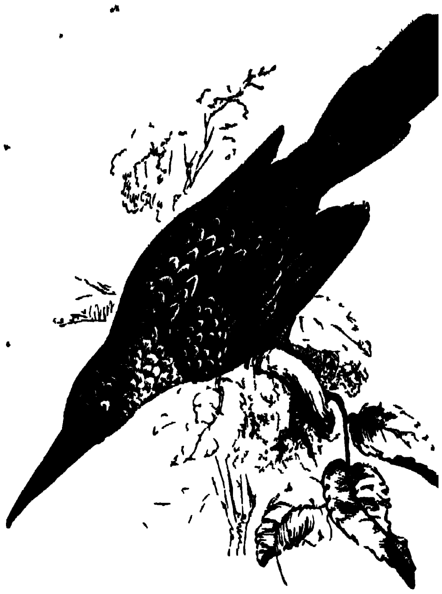
1347. Cinnamon Crab-eater



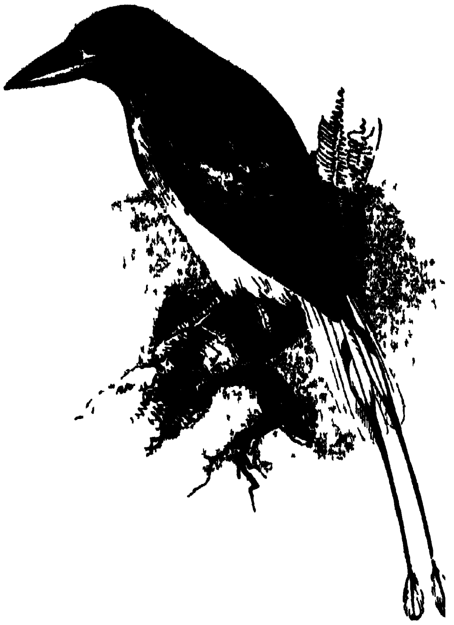
1353.—Luçon Ceyx.

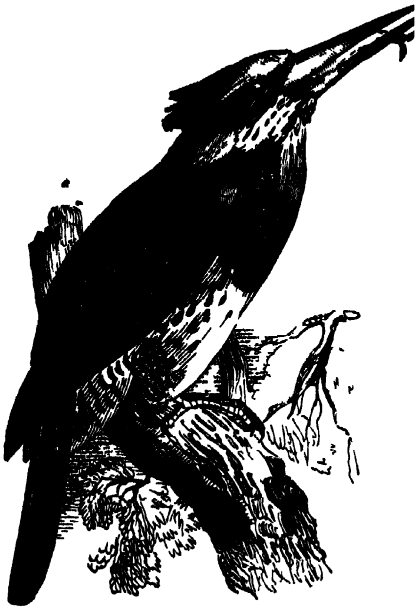


1358 —Paradise Jacamar

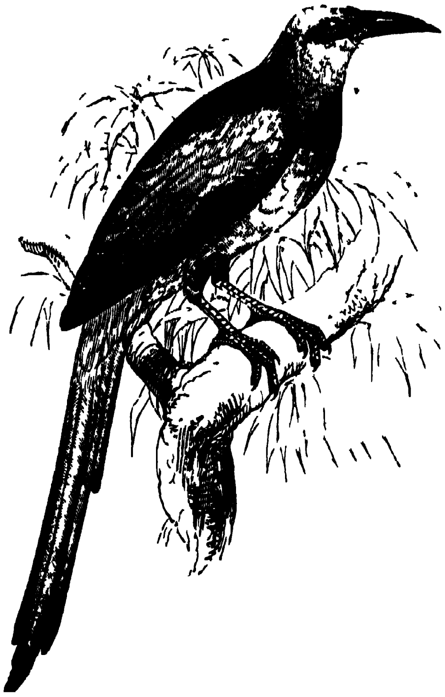


[illegible]

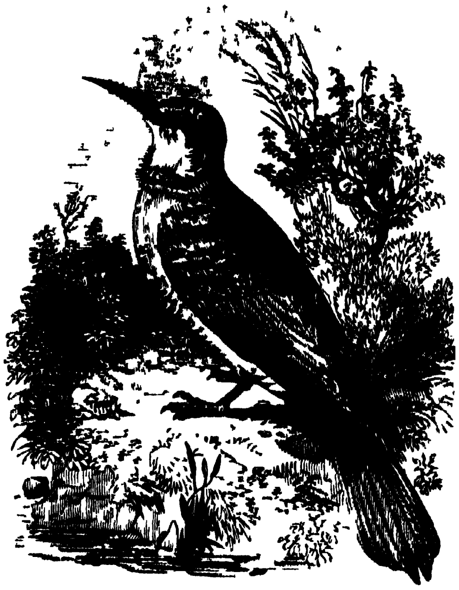


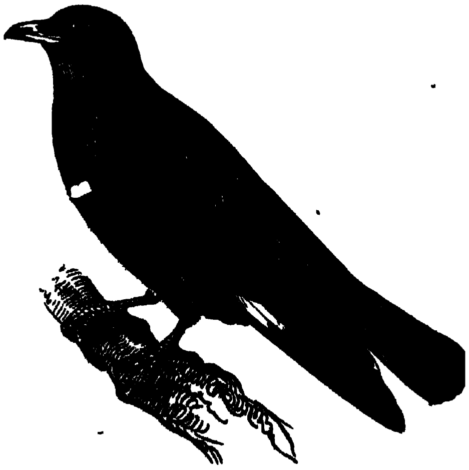


1354.—Great Senegal Kingfisher

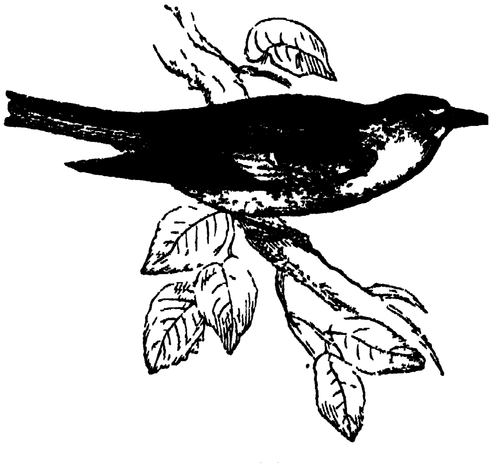


[illegible] Motmot

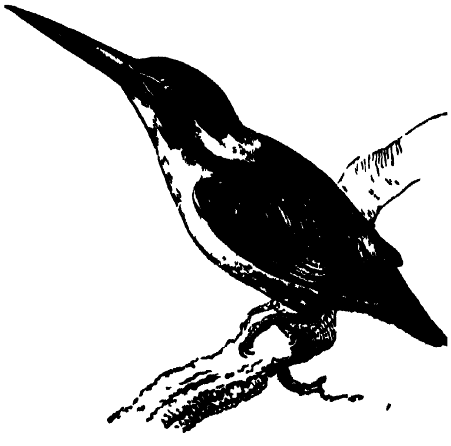




1364.—Oriental Swallow-Roller.



1362 —Roller.



1356 —New Holland Kingfisher.

past the trout lurking beneath the concealment of some stone or in the shadow of the bank—the roach and dace pursuing their course. At length, attracted by a floating insect, one rises to take the prize; at that instant, like a shot, down descends the glittering bird, the crystal water scarcely bubbling with its plunge; the next moment it re-appears, bearing its victim in its beak, with which it returns to its resting place; without loosing its hold, it passes the fish between its mandibles, till it has fairly grasped it by the tail; then by striking smartly its head three or four times against the branch, ends its struggles, reverses its position, and swallows it whole. Quiet secluded nooks, seldom disturbed by the intrusion of any save the "honest angler," sheltered spots of the river margined with alders and willows, mill-dams, surrounded by tranquil pastoral scenery, are the favourite haunts of this bird. Its mate is its only companion, and both labour assiduously in the support of their young. The place chosen for incubation is the bank of the river where it is steep or overhanging, and here it either constructs, or appropriates to itself, a burrow two or three feet in extent, bearing diagonally upwards. It is said to select not unfrequently the old burrow of a water-rat, but of this we are not convinced, at all events we have seen the holes of the kingfisher half-way down the steep and perfectly perpendicular face of banks, which the water-rat could not have made, and which, we have no doubt, were the work of the birds themselves At the end of the gallery is a little chamber, and here, without making any nest, the female lays her eggs, from five to seven in number, and of a clear pinky white. While engaged in the work of incubation the female is supplied by her industrious mate, and as the fish-bones and scales are disgorged (for, like owls, the kingfisher recasts the indigestible parts of its food), a circle of these rejectanea surround the eggs, which, after the young are hatched, is greatly increased, and hence has arisen the supposition that of pellets of fish-bones is the nest composed The young are clamorous for food, uttering an incessant cry, they soon acquire their brilliant plumage, and when able to leave their abode, follow their parents, and resting on a branch in some lonely retreat, tax the industry of their parents They are, however, soon able to fish for themselves.

The kingfisher performs a sort of limited migration: when winter sets in and drives the fish from the shallows to deep and sheltered bottoms, freezes the mill-dams, or coats with ice the sluggish basin worked out by the river's current in rich alluvial soil, these birds wander from the interior to the coast, and frequent the mouths of rivulets, entering large navigable rivers, dikes near the sea, and similar places, especially on the southern portion of our island. This circumstance was not unknown to Belon, and in his 'Portraits d'Oyseaux,' under the cut of the kingfisher he gives the following "quatrain:"—

> "Le Martinet peschour fait sa demeure
> En temps d'hiver au bord de l'ocean,
> Et en este, sur la rivière ou estan,
> Et de poisson se repaist a toute heure."

The colouring of this beautiful bird is as follows Bill blackish brown, reddish at the base. Behind each eye is a patch of light orange brown, succeeded by a white one. From each corner of the under mandible proceeds a streak of verditer blue, tinged with verdigris green. Crown of the head deep olive green, the feathers tipped with verdigris green From the nape of the neck to the tail is a strip of verditer blue feathers, tinged in some shades with verdigris green Chin and throat yellowish white. Breast, belly, and vent orange brown, palest towards the under tail-coverts Tail greenish blue, the shafts of the feathers black. Legs pale tile red (Selby)

The irides are hazel The bill of the female is not so long as in the other sex. The colours also are deeper and more of a green shade. Length, seven inches.

1351.—THE SACRED KINGFISHER

(Todiramphus sacer). The Sacred Kingfisher (with other allied species) is a native of the islands of the South Seas. These birds inhabit woods, and perch almost constantly on the cocoa-palms Their nourishment appears to consist almost exclusively of small flies; these they catch, when settling on the spathes loaded with the flowers of the palm. The islanders name these birds O-tataré, and used to regard them as sacred, severe penalties being inflicted on those who destroyed them.

In the islands of Tahiti, Borabora, &c., the present species is very common, frequenting the cocoa-nut trees, which form girds on the shores of those islands. Its flight is short, and it is not timid. According to Latham it has been found in Dusky Bay, New Zealand.

The total length of this beautiful bird is about nine inches. Bill black, white at the origin of the lower mandible; summit of the head covered with brownish green feathers, which form a sort of hood, separated by a large white streak which rises on the front, passes above the eyes, and continues behind the occiput. A large black line springs from the eye, and taking a tinge of green and then of brown, forms a border to the white line and circumscribes it. Throat, breast, and all the upper part of the body pure white; a very large, whitish, demicollar, waved with light brown and very light chestnut, occupies the upper part of the mantle and is bordered with black; the back, coverts of the wings, rump, upper part of the tail and wings, are uniform bluish green; primaries brown and blue on their external edges, secondary lapped with brown; tarsi black.

1352.—THE BURUNG-BIRU

(*Ceyx Meninting*). The Burung-biru, or Meninting watu of the Javanese; Alcedo Biru, Horsfield.

The genus Ceyx has only two feeble anterior toes and a hind-toe; the bill is straight and sharp. The tail very short.

Dr Horsfield describes the Burung-biru as by no means uncommon in Java He observed it chiefly in the interior in low situations, but it was also found in the maritime districts. Its habits and manners were those of the European kingfisher. It darts in short, rapid flights along the surface, over rivulets and lakes, emitting as it moves shrill sounds in a high key These sounds are so strong and acute, that when the bird is near they strike the ear in an unpleasant manner. It is not unfrequently observed perched on trees on the banks of rivulets, and its food consists of small fishes and aquatic insects. This species is found also in New Guinea.

1353 —THE LUÇON CEYX

(*Ceyx tridactyla? Alcedo tridactyla*, Latham) This species, which inhabits the Isle of Luçon, is described by Sonnerat as about one-third less than the European kingfisher, and as one of the most brilliant of birds The upper surface is of a deep lilac, the wings deep glossy indigo blue, with a border of shining light blue round each feather. Under parts white, bill of a pale carmine red; feet red Colonel Sykes notices the Ceyx tridactyla among the birds of the Dukhun.

1354 —THE GREAT SENEGAL KINGFISHER

(*Ispida gigantea*). This large species, a representative of the subgenus Ispida of Swainson, is a native of Senegal, above it is cinereous spotted with white, chin and cheeks white: breast with a broad rufous band; head above black, crested behind

Of the manners of this species, excepting that they generally resemble those of the common kingfisher, and other species of the genus Alcedo, nothing is definitely known.

1355 —THE NEW HOLLAND KINGFISHER

(*Alcyone Australis*) The genus Alcyone differs from Alcedo only in the feet, having three toes, two before. In its habits and manners this beautiful bird resembles our British species, having the same rapid arrow-like flight and the same mode of darting on its prey It haunts streams and rivers, perching on the branches of dead trees, and from its post of observation plunges into the water beneath, seldom missing its finny victim The body above and the sides of the head and neck are shining mazarine blue, under parts rufous, throat whitish, wings dusky black. It is described and figured by Mr. Swainson ('Zool. Illus.,' 1st series) under the title of Alcedo azurea.

1356 —THE TERNATE KINGFISHER

(*Tanysiptera Dea*), Alcedo Dea, Linn.; Martin-pêcheur de Ternate, Buffon. In the genus Tanysiptera the bill is rather short and thick, straight and acute, the tail is graduated; the two middle tail-feathers the longest. This beautifully coloured bird is a native of the Moluccas, and it mostly happens that the specimens brought to Europe are destitute of the wings and legs. According to Mr. Vigors, this bird links the true kingfishers to the Jacamars (Galbula) (approaching most nearly to the Paradise Jacamar), and resembling those birds in its habits, which, however, are not very fully ascertained.

This species is intense black-azure above, white beneath; head and wing-coverts cœrulean blue; -feathers white, margined with cœrulean; the two middle ones cœrulean, running out narrow, and ending spatulate, the web of the terminal portion being white.

1357.—THE BROAD-BILLED LAMPROTILA

(*Lamprotila platyrhyncha*). Mr. Swainson, who founded the genus Lamprotila, gives the following characters:—Plumage metallic green and gold; bill very broad, and dilated ridge curved; nostrils membranaceous, protected by feathers; the wings in form approaching those of the jacamars; the third and fifth quill-feathers equal.

This bird, the plumage of which glitters with changeable metallic hues of burnished green and gold, appears to resemble the jacamars in its habits, darting from its perch at insects as they pass, and returning to its post of observation. We have yet much to learn respecting its economy.

1358 —THE PARADISE JACAMAR

(*Galbula paradisea*); the Swallow-tailed Kingfisher of Edwards. The genus Galbula is distinguished by its metallic plumage; by the bill being very long, perfectly straight, and greatly compressed; wings short; tail lengthened and graduated; toes in pairs (zygodactylous), or the hind-toe wanting: nostrils with a few strong bristles. Cuvier, who places the jacamars in the Scansorial order, observes that in either points they approach the kingfishers; and both Mr. Vigors and Mr. Swainson, as well as Mr. G. Gray, assign them to the family of the latter. The jacamars are recluse birds, tenanting extensive woods; "they generally sit on low naked branches in the forest paths, whence they dart upon butterflies, spearing them with their long bill; their haunts, indeed, may frequently be known by the ground being strewed with the beautiful wings of their victims, the body of which alone they devour." All the species are American. The Paradise Jacamar is a native of Surinam: its size somewhat exceeds that of a lark; the general colour is golden green; the throat, neck, and lesser wing-coverts are white, the head violaceous brown, the bill and feet, the latter of which are feathered to the toes, black, the two central tail-feathers are the longest.

1359 —THE MEXICAN MOTMOT

(*Prionites Mexicanus*). Generic character:—Both mandibles slightly curved and compressed; the margins with strong denticulations. Tongue long, slender, the sides ciliated Wings short, rounded. Tail lengthened, cuneated. Feet gressorial, as in Merops (Sw.)

Mr Swainson ('Classification of Birds') remarks that every writer since the days of Linnæus (who at first actually classed them in the same genus) has placed the motmots (Prionites) and the toucans (Ramphastos) close together, not only from the similarity of their habits, but from the structure of the tongue, which in both is long, and so much ciliated at its sides as to resemble a feather, so far, therefore, he observes, the resemblance is unquestionable "But," continues Mr Swainson, "the feet of the motmot are totally different from the toucan, they are not scansorial, but of that particular structure so common among the Fissirostres. The toucans we know, from personal observation, to be gregarious, living in flocks, and seeking their food from the tops of lofty trees the motmot is solitary, hiding in the deep shades of the forests, and, like other ant-feeding birds, is always found sitting nearly motionless Here, then, is a very obvious departure from the structure and habits of the toucan The question then is, to what does it lead? If to the hornbills (which has been inferred from the structure of the feet), we should have no diminution in the size of the bill, which in both the hornbills and toucans is equally large, but in the motmot of an ordinary and proportionate size: we should further expect a bird which was gregarious, since both these groups are so. Yet there is nothing in the motmot, beyond its feet, which will at all assimilate it to the perchers, while its fissirostial habit of catching its food upon the wing, and the discovery of the broad-billed species, Prionites platyrhynchus, seems to us a conclusive argument for placing this genus in the fissirostial order, as more intimately connected to the jacamars (Galbula) than to any other known genus

Mr. Swainson ('Zool. Illus.') states that the motmots or momots, "so named from their monotonous note, live only in the tropical forests of the New World, preferring those deep recesses of perpetual shade where a high canopy of matted foliage nearly excludes the rays of a vertical sun. They appear even more solitary in their disposition than the trogons; their note may be heard, morning and evening, from the depths of the forests, but the bird is never seen, unless the hunter comes unexpectedly upon its retreat. This we have generally found to be a low withered branch completely shaded and just at the edge of such paths as are made by the Cavies or the Indians. The jacamars and the trogons both love these shady nooks, where they sit nearly motionless, watching for passing insects, on which they dart. Such is, no doubt, the manner in which the motmot feeds; but his strong conformation enables him to capture larger game. Travellers assert that he also devours the eggs and young of other birds, like the toucans; this we believe, as both have the same long and feather-like tongue."

The present species is green above, paler beneath; the ear-coverts are black, varied, and tipped with bright blue.

Family MEROPIDÆ (BEE-EATERS).

Mr. Swainson ('Classification of Birds,' vol. ii.) is of opinion that the Meropidæ, or Bee-eaters, succeed the swallows, and says of the Merops Apiaster, that it annually visits Italy in flocks of twenty or thirty, and may be seen skimming over the vineyards and olive plantations with a flight much resembling the swallow, though more direct and less rapid. He observes that their bill is indeed considerably longer and more slender, but remarks that this difference is softened down by the intervention of the genus Eurystomus, containing the swallow-rollers of India, Africa, and Australia, which have this organ very short. To these, he thinks, succeed the true rollers, Coracias (Linn.), which arrive in Italy at the same time with the bee-eaters, and associate also in small flocks. "These two genera of rollers," continues Mr. Swainson, "are so indissolubly united, that nothing but the strongest prejudice in favour of a preconceived theory could ever have induced certain naturalists (whose labours in other respects have been of much advantage to science) to have placed them in two different orders. The whole structure of the Rollers, their lengthened pointed wings, and their firm and often forked tail, at once induces the idea that they feed upon the wing; while their very short legs, scarcely longer than their hind-toe, might have shown their incapacity to alight and walk, like the crows, upon the ground; but this question is at once decided by a knowledge of their economy, which, from personal observation, we have every reason to believe is much like that of the Bee-eaters. The intervention of the Rollers at once lessens the abrupt transition, which would otherwise be apparent, from the perfect-footed Swallows to the zygodactyle Bee-eaters; and we are thus prepared for all those birds whose toes, as it were, are soldered together like those of the Meropidæ. Here perhaps we may notice that most beautiful and rare genus Nyctiornis, or Night-feeder, as being in all probability that particular link by which Nature connects this family with the Trogons.

1360.—The Bee-eater

(*Merops apiaster*). Bill very long and slender; slightly curved, compressed, sharp at the tip; wings long and pointed; outer and middle toes connected as far as the first joint (zygodactylous).

This brilliant species, which occasionally wanders as far westward as the British Isles, is a summer visitant to the southern and eastern provinces of Europe; it is common in Sicily, Italy, Spain, Greece, Turkey, &c., whence it retires into Africa on the approach of winter. In Spain, which it enters by way of Gibraltar, it appears during the first week in April, in flocks of forty or fifty, sometimes at considerable elevation, at other times skimming low, and uttering a shrill whistle heard at a considerable distance. They thus give chase to various insects, bees, wasps, beetles, grasshoppers, and butterflies, catching them on the wing with great address. Bee-eaters haunt rivers and streams, and may be seen coursing up and down in pursuit of their prey, and glittering in the sun with metallic effulgence. They abound on the rivers Don, Volga, and Yaik, in Southern Russia, and are common in Syria and Arabia. In their habits these birds much resemble the kingfisher: they breed in holes, which they burrow in steep banks overhanging the river, at the extremity of which, in a nest, according to Selby, composed of moss, &c., the eggs are laid: these are of a pure white, and from five to seven in number. It is observed also that, like the kingfisher, which recasts the bones and scales of fishes, these birds disgorge the wing-cases and other indigestible parts of their insect food rolled up in the shape of small pellets.

From the earliest times the bee-eater has been notorious for thinning the hive of its industrious inhabitants. Aristotle notices this circumstance; and Virgil directs that the beehives must be secured from the lizard, the swallow, and the bee-eater:—

> "Absint et picti squalentia terga lacerti
> Pinguibus a stabulis; *Meropesque* aliæque volucres,
> Et manibus Progne pectus signata cruentis;
> Omnia nam late vastant: ipsasque volantes
> Ore ferunt, dulcem nidis immitibus escam."
>
> *Georg.*, lib. iv.

According to Latham this bird is called in Egypt Melino-orghi, or Bee's enemy. It is there eaten for food, as Ray states it is in Italy, where he saw it sold in the markets. The bee-eater is not only found in Europe, Asia, and Northern Africa; it is also a native of the Cape of Good Hope. The colouring of this bird is as follows:—Forehead yellowish white, merging into bluish green; back of the neck and upper part of the back rich chestnut, passing into brownish amber yellow. Ear-coverts black; wings greenish, with an olive tinge, and a large band of brown across the middle. Quill-feathers fine greenish blue, ending in black. Throat bright yellow, bounded by a line of black. The under parts generally glossy greenish blue. Irides red. Length, eleven inches.

1361.—The Red-breasted Night-feeder

(*Nyctiornis amictus*). Bill considerably curved and very long; the ridge with a parallel groove on each side; tarsi very short. The night-feeder is a native of India; but we have no account of its habits, except that it feeds on insects, and, as its name denotes, is crepuscular or nocturnal. The general plumage is green; the crown in adults is lilac; the front of the throat and breast bright red. Total length, thirteen inches.

1362.—The Roller

(*Coracias garrula*). Bill moderate, straight, the sides broad, but much compressed; tip of the upper mandible bent over that of the lower; nostrils basal, oblique, linear; gape very wide, with the edges bristled; tarsi short; toes cleft to their base.

The roller is only an accidental visitor to England, where, however, it has been several times killed; but there is some reason to think that formerly, when our island offered extensive forests for its shelter, that it was not uncommon, for it has a name, "y Rholydd," in the ancient British language. It is the Pica Marina and Pica Merdaria of the Italians; Rollier of the French; Birk-Heher, Blaue-Racke, and Mandelkrahe of the Germans; Spransk Kraka, Blakraka, and Allekraka of the Swedes; Ellekrage of Brunnich.

On the continent this bird has a very extensive range. In Europe, it is found in Denmark, Sweden (where it arrives with the cuckoo), and the southern provinces of Russia; is more common in Germany than France, where, however, it has been found in Provence; and it has been taken at Gibraltar. In Italy, according to Prince C. L. Bonaparte, it is rather common, arriving in the spring and departing in September. In Malta and Sicily it is exposed for sale in the shops of poulterers, and is said to have the taste of a turtle-dove. In the Morea it is considered a delicacy in the autumn, when it is fat with its summer food. It has been captured at Aleppo, and at Trebizond and Erzeroum. It visits the countries between the Black and the Caspian Seas; and Dr. von Siebold and M. Bürger include it among the birds of Japan. In North Africa it is found from Morocco to Egypt; flocks were seen by Adanson at Senegal, and he concluded that they passed the winter there. Dr. Andrew Smith records it among the birds of South Africa.

The roller is wild, shy, restless, and fierce, frequenting, by way of preference, deep forests of oak and birch, where its harsh cry may be often heard. In the 'Annals of Natural History' for 1839, it is stated by a traveller in Asia Minor, that the roller, which was most common throughout the south and west parts of the country wherever the magpie was not found (for it was not seen in the same district with that bird), was observed to fall through the air like a tumbler pigeon. Temminck states that it makes its nests in the holes of trees, where it lays from four to seven eggs of a lustrous white. M. Vieillot states that in Malta, where trees are scarce, the bird builds on the ground. In Barbary it has been observed to form its nest on the banks of the Sheliff, Booberak, and other rivers; and Pennant remarks that where trees are wanting, it makes it in clayey banks. These last modes of nidification bring it very close to the bee-eaters and kingfishers, whose eggs quite resemble those of the roller in colour and shape, and only vary in size. The male takes his turn to sit. The food is very varied, according to Temminck, who enumerates moles, crickets, cockchafers, grasshoppers, millipedes, and other insects, slugs, and worms. Gould states that it feeds on worms, slugs, and insects generally. Yarrell informs us that the food consists of worms, slugs, insects in their various stages, and berries. The colouring of this species is as follows:—Bill black towards the point, becoming brown at the base with a few bristles; irides of two circles yellow and brown; head, neck, breast, and belly various shades of verditer blue changing to pale green; shoulders azure blue, back reddish brown, rump purple, wing-primaries dark bluish black, edged lighter, tail-feathers pale greenish blue, the outer ones tipped with black, those in the middle also much darker in colour: legs reddish brown; in old males the outer tail-feathers are somewhat elongated.

Adult females differ but little from the males; young birds do not attain their brilliant colour till the second year. Length, about thirteen inches.

1363.—The Abyssinian Roller

(*Coracias Abyssinica*). This species of Roller is a native of Abyssinia, and in general habits resembles the preceding, tenanting woods and forests. The colouring is as follows:—White round the bill; body aquamarine green; back and wing-coverts cinnamon colour; shoulders, rump, and quills, blue; tail green, the two middle feathers blue; two long loose processes terminating the two external quills.

1364.—The Oriental Swallow-Roller

(*Eurystomus Orientalis*). This genus is closely allied to Coracias, but the bill is shorter and wider, and the wings longer than in that form. The Oriental Swallow-Roller is a native of Java, the south of New Holland, and all the Polynesian Islands. It is the Naytay-kin of the natives of the neighbourhood of Sidney, Dollar-bird of the colonists, and Tiong-ba-tu of the inhabitants of Sumatra; Coracias Orientalis, Linn. It is a bird of rapid and vigorous flight, and feeds upon various kinds of insects. Its general colour is aquamarine green; the throat and point of the wing are azure; the quill-feathers black, with a white bar; tail black.

1365.—The Green Leptosome

(*Leptosomus viridis*). From its zygodactyle feet (two toes before and two behind), this bird, with others of the genus, has been placed, by most writers on ornithology, in the family of the Cuckoos (Cuculidæ). Mr. Swainson, however, regards it as one of the forms of the Meropidæ, and thus characterises it:—Bill about the length of the head, robust. The upper mandible curved and notched near the tip. Nostrils oblong, oblique; the margins elevated, naked, and placed towards the middle of the upper mandible. Feet short. Toes in pairs, as in Tamatia. Wings lengthened, pointed; the first and second quills longest. Tail moderate, even. (Sw.)

The present bird is a native of Africa, and is found in Caffraria and on the coast of Zanzebar. It inhabits the forests, feeding on insects, and also, as is stated, upon fruits; but we know little of its habits.

Family TROGONIDÆ (TROGONS).

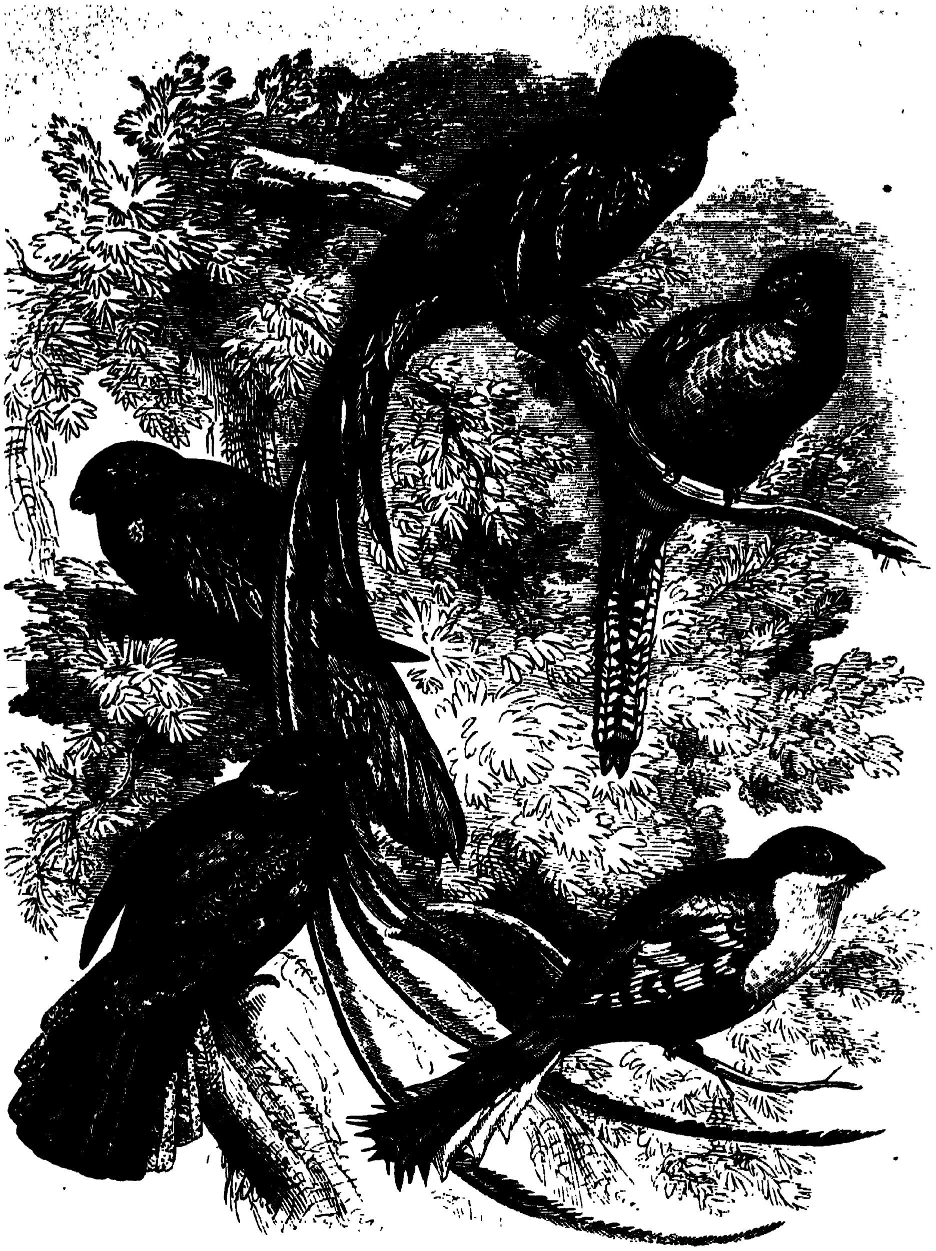
The Trogons constitute a family of birds, the members of which are peculiar to the hotter regions of America and of India, and its adjacent islands, Ceylon, Java, Borneo, Sumatra, &c., one species only having as yet been discovered in Africa. Among the most conspicuous of the feathered tribes for beauty and brilliancy of plumage, the Trigons stand confessedly pre-eminent. The metallic golden green of some species is of dazzling effulgence; in others less gorgeous: the delicate pencillings of the plumage, and the contrasted hues of deep scarlet, black, green, and brown, produce a rich and beautiful effect.

It is difficult to convey the idea of a bird, or indeed of any natural object, by description solely; the pictorial specimens, however, in the group Fig. 1366, will render the details connected with the family features of the present group easily intelligible.

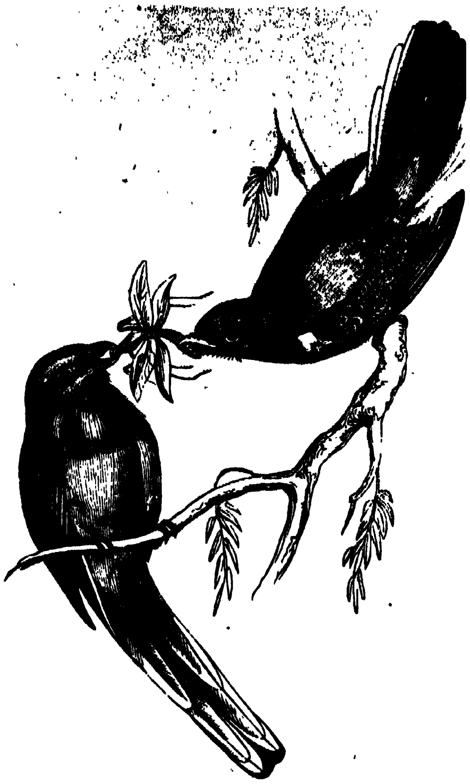
The Trogons are zygodactyle, that is, they have their toes in pairs, two before and two behind, like parrots and woodpeckers; the tarsi are short and feeble, the beak is stout, and the gape wide; the general contour of the body is full and round, and the head large; the plumage is dense, soft, and deep; the wings are short but pointed, the quill-feathers being rigid; the tail is long, ample, and graduated, its outer feathers decreasing in length; in some species the tail-coverts are elongated, so as to form a pendent plumage of loose feathers.

Of solitary habits, the Trogons (or Couroucous) frequent the most secluded portions of dense forests, remote from the abodes of man. For hours together they sit motionless on some branch, uttering occasionally a plaintive melancholy cry, especially while the female is brooding on her eggs. Indifferent during the day to every object, listless or slumbering on their perch, they take no notice of the presence of an intruder, and may indeed be often so closely approached as to be knocked down by a stick; the bright glare of the sun obscures their sight, and they wait for evening, the dusk of twilight being their season of activity.

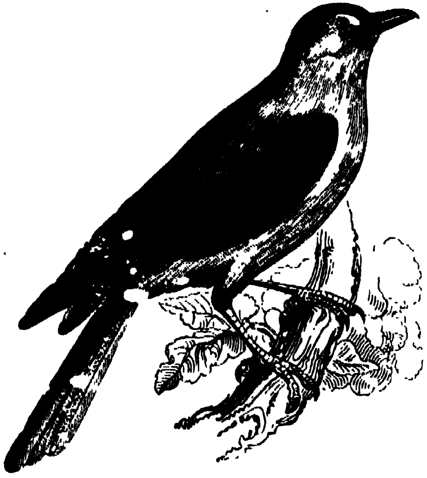
Fruits, insects and their larvæ, constitute their food. Formed, most of them at least, for rapid but not protracted flight, they watch from their perch the insects flitting by, and dart after them with surprising velocity, returning after their short chase to the same point of observation. Some, however, are almost exclusively frugivorous. Many species are certainly migratory. M. Natterer observes, respecting the Pavonine Trogon (Trogon pavoninus, Spix), which inhabits, during a certain season of the year, the high woods along the upper part of the Amazon and Rio Negro, that he found the contents



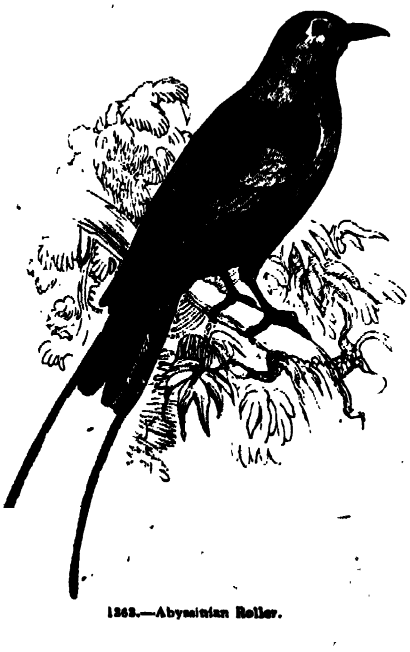
1366.—Group of Trogons.



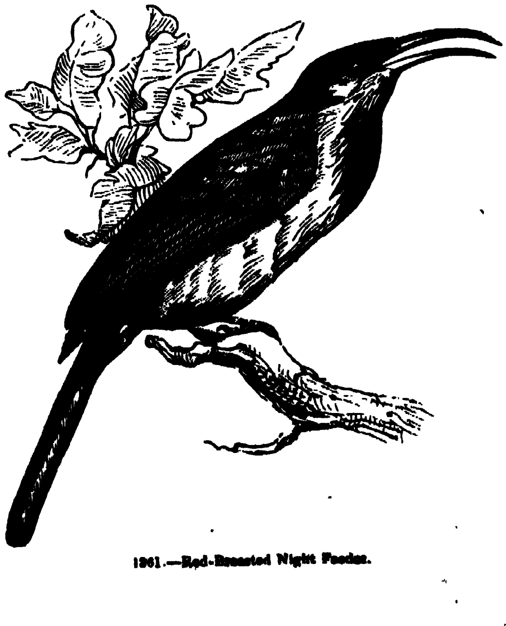
1368.—Narina Trogons.



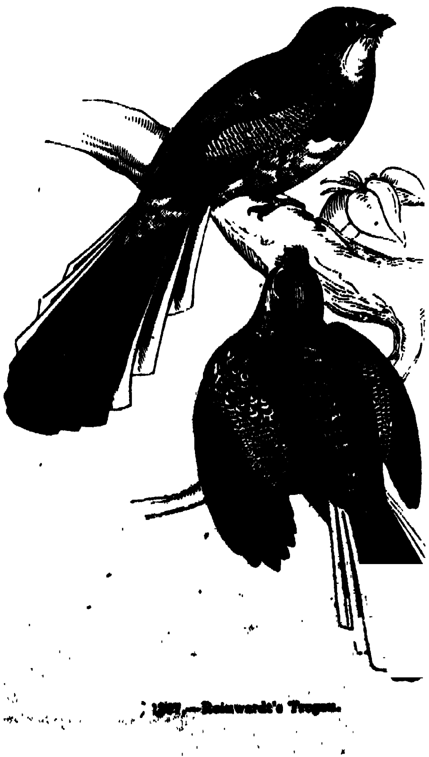
1365.—Green Leptosome.



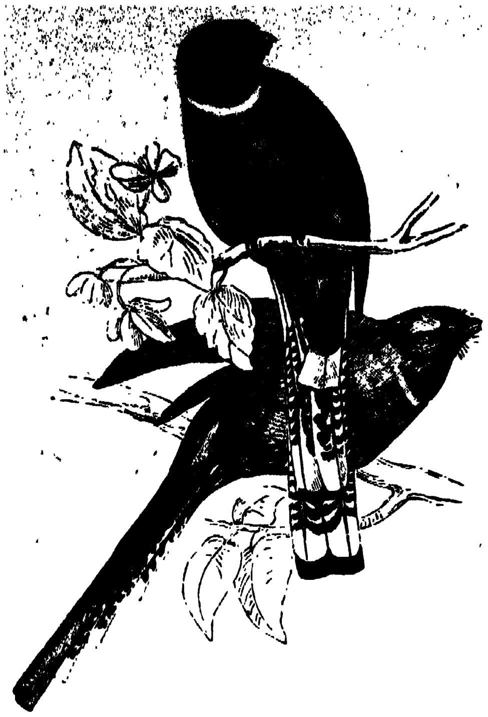
1363.—Abyssinian Roller.



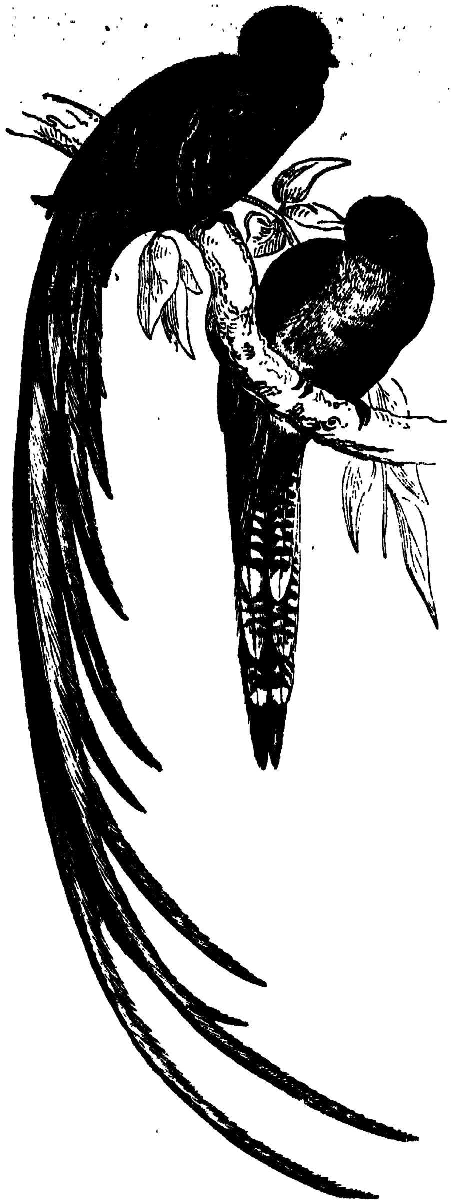
1361.—Red-Breasted Night Feeder.



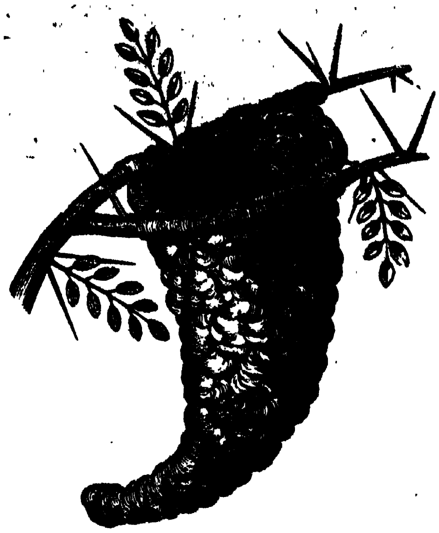
[illegible].—Reinwardt's Trogon.



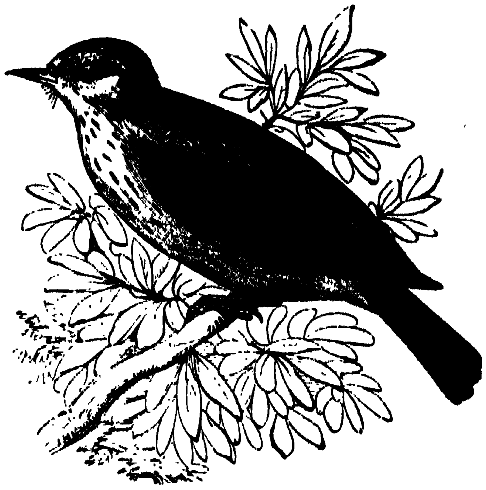
1370.—Mexican Trogons



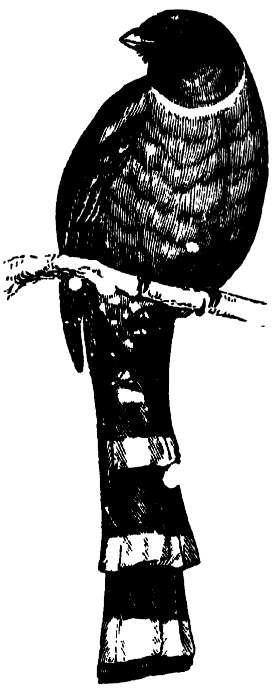
1371.—Resplendent Trogons.



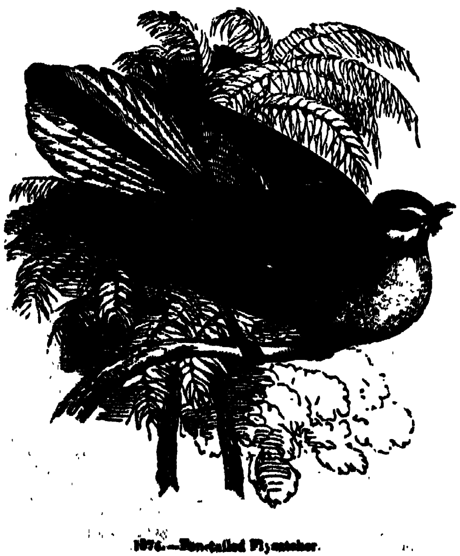
1375.—Nest of Flycatcher.



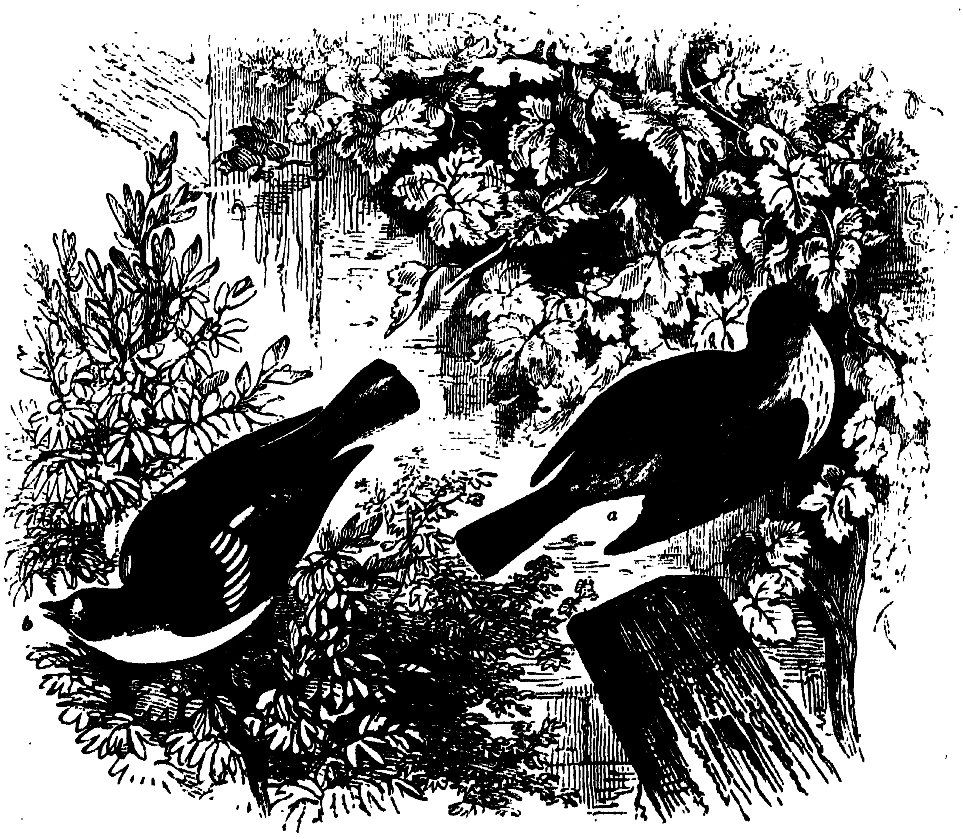
1372.—Spotted Flycatcher.



1369.—Mexican Trogon.



1374.—Fan-tailed Flycatcher.



1373.—a, Spotted Flycatcher; b, Pied Flycatcher.

of its stomach to consist principally of the fruit of a certain species of palm, and that it arrives in those districts when its favourite food is ripe, but that when the trees no longer yield an adequate supply it retires to other districts.

Like the parrots and woodpeckers, the Trogons breed in the hollows of decayed trees, the eggs being deposited on a bed of wood-dust, the work of insects; they are three or four in number, and white. The young, when first hatched, are totally destitute of feathers, which do not begin to make their appearance for two or three days; and their head and beak appear to be disproportionately large. They are said to rear two broods in the year.

Azara, speaking of the Surucua Trogon, a native of Paraguay and the Brazils, informs us that it is seen only in the largest woods, and that it "generally remains on the upper portions of the trees, without descending to the lower branches or to the earth; it sits a long time motionless, watching for insects which may pass within its reach, and which it seizes with adroitness; it is not gregarious, but dwells either in solitude or in pairs; its flight, which is rapid and performed in vertical undulations, is not prolonged. These birds are so tame as to admit of a near approach; I have seen them killed with a stick. They do not migrate, and are never heard except in the breeding season; their note then consists of the frequent repetition of the syllables *pee-o*, in a strong, sonorous, and melancholy voice; the male and female answer each other. They form their nest on the trees, by digging into the lower part of the nest of a species of ant, known by the name of cupiy, until they have made a cavity sufficiently large, in which the female deposits her eggs, of a white colour, and two, or as some assert four, in number. I have seen the male clinging to a tree after the manner of woodpeckers, occupied in digging a nest with his beak, while the female remained tranquil on a neighbouring tree."

The American Trogons have their beak of moderate size, with serrated (or saw-like) edges, and furnished at its base with bristles; the upper surface (of the males at least) is of a rich metallic green, the under parts being more or less universally scarlet or rich yellow. The outer tail-feathers in the majority of the species are more or less barred with black and white.

In the Indian Trogons the beak is larger and stouter, with smooth edges, having a tooth near the tip of the upper mandible. The eyes are encircled by a large bare space of richly-coloured skin; the upper surface is brown, the lower more or less scarlet, and the outer tail-feathers exhibit no tendency towards a barred style of marking, excepting in one species, Diard's Trogon (Trogon Diardii), in which the three outer tail-feathers are finely powdered with black.

The African species (Trogon Narina, Le Vaill.) closely approximates to its American relatives; but its three outer tail-feathers are unbarred. This species inhabits the dense forests of Caffraria; during the day it sits motionless on a low dead branch, and it is only in the morning and evening that it displays activity. Locusts and other insects are its principal food.

Of all the Trogons none are so magnificent as the Trogon resplendens. This bird, as stated by Mr. Gould, "is to be found only in the dense and gloomy forests of the southern states of Mexico." Little known to Europeans, except within the last few years, the brilliant plumes which fall over the tail (and which, as is the whole of the upper surface of the body of this bird, are of the richest metallic golden green) were made use of by the ancient Mexicans as ornaments on their head-dresses; and gorgeous must a head-dress be, composed of such feathers—soft, flowing, of dazzling lustre, and three feet in length. In later times they have occasionally been transmitted as curiosities to Europe. Mr. Gould observes that M. Temminck is the first who figured the present species; but that celebrated naturalist confounded it with the Trogon pavonius of Dr. Spix, a Brazilian species to which it is nearly allied, but from which it differs in having a soft silky crest, of long full feathers, and the plumes of the tail coverts extremely long, whereas in the Pavonine Trogon there is no crest, and the tail-coverts do not extend above an inch or two at most beyond the tail.

1366.—A Group of Trogons.

On the topmost branch are perched a pair, male and female, of the Trogon resplendens. The middle bird towards the left hand is the Trogon pavonius. The lower figure on the left hand is the Trogon Diardii; and that on the right, the Trogon temnurus.

The Trogons are divided into several subgenera, founded upon tangible characters, doubtless involving a difference, more or less decided, of habits and manners. Mr. Gould remarks, for example, that the species of the subgeneric group Calurus, distinguished by a redundancy of flowing plumage, are not, as may be expected, so well fitted for flight, or for taking their prey on the wing, as are the more closely-plumed species to which the generic name Trogon is now restricted; accordingly Mr. Natterer informed Mr. Gould that the gorgeous birds of the former group tenant the topmost branches of the loftiest forest-trees, clinging beneath them like parrots, and feeding more exclusively on fruits and berries. On the other hand, Mr. W. S. Mac Leay states that the singular Trogon inhabiting Cuba (Trogon temnurus, the only example of the subgenus Temnurus; Priotelus, G. R. Gray), which approximates to the woodpeckers in the more lengthened form of the bill, in the rigid character of the outer tail-feathers, and in the spotting of the wings, approaches those birds also in its habits, giving a preference to the holes of trees rather than to the branches, and procuring from the bark the larvæ and various insects which constitute its food.

The habits of the Old World species are much less known than those of the American Trogons; but from the more robust form of their bill and their wide gape, Mr. Gould is inclined to suspect that they feed even still more exclusively on insects than on fruits: independently, however, of the greater strength of the bill, the non-serration of the edges of the mandibles, and the half-denuded face, they may, Mr. Gould remarks, at all times be distinguished by the rich brown colouring of the backs of the males, and by the entire absence of bars across the outer tail-feathers. With respect to the brown colouring of the plumage, there are, he adds, it is true, one or two exceptions from the rule, but none to the absence of the barring of the tail-feathers when accompanied by the former characters.

1367.—Reinwardt's Trogon

(*Trogon Reinwardtii*). This species is an example of the subgenus Apaloderma, and is a native of Java and Sumatra, where, however, it is rare; or perhaps a tenant of the remoter solitudes of the forests, and therefore escapes observation. Our pictorial specimens are an adult male and (the lower figure) a young bird.

Bill bright reddish orange; top of the head, back, and upper tail-coverts dark green; six middle tail-feathers black, with green reflexions; the bases of the three outer feathers on each side the same colour as the middle ones, the remaining portions being white; centre of the wings and shoulders green transversely rayed with fine lines of yellow; primaries black, with the exception of the outermost web, which is white; throat yellow; ear-coverts, sides of the neck, and chest olive brown; belly and under surface yellow, becoming rich orange on the sides; tarsi yellow; bare skin round the eye blue. Total length, from twelve inches and a half to thirteen inches and a half; tail seven inches and a half; wing five inches and a half.

Young:—Similar to the adult, particularly in the colours of the back and tail, a circumstance, observes Mr. Gould, which rarely occurs in the family, as in all the Trogons where the plumage of the female differs much from that of the male, the young birds generally resemble the former; while, as in the present case, where the sexes are nearly alike, the young partake of the adult colouring, differing only in the markings of the wings and the rufous brown tint of the breast. (Gould.)

1368.—The Narina Trogon

(*Trogon* [Apaloderma] *Narina*). This is the only African species, and is a native of Caffraria; Narina, whose name it bears, was a Gonaqua Hottentot girl, whose charms and manners appear to have produced a great impression on Le Vaillant (the discoverer of the bird), as he devotes some pages to her in his 'Travels.'

According to this account of the naturalist, the haunts of the Narina Trogon are the thickest parts of the forest; and there it sits nearly motionless, on a low dead branch during mid-day: in the morning and evening it captures its food, consisting chiefly of locusts, beetles, and other winged insects, with the addition of caterpillars. Its flight is short and rapid; and it darts from its chosen perch on every passing insect, returning to the station which it had left, or settling near it. During the pairing season the male, which is at other times mute, utters frequently a melancholy cry. The eggs, four in number, nearly round, and of a rosy white hue, are laid in a nest in the hole of a tree, and the female sits for twenty days. Our pictorial specimens are a male and female.

Male:—Bill yellow, with a tinge of blue; whole of the head, throat, chest, shoulders, back, and upper tail-coverts resplendent green; breast and under surface bright blood-red; the wings brown, the greater coverts and secondaries powdered with greyish white, the outer edge of each feather having a tinge of metallic green; two centre feathers of the tail dark purplish green, two next on each side dark olive-green; the three outer on each side dark green at their base, largely tipped with white; feet light brownish yellow.

Female:—Upper surface and tail closely resembling those of the male; round the eye and throat rufous brown, becoming paler on the chest, which is slightly tinted with rosy pink; lower part of the abdomen and tail-coverts deep rose-red. Total length eleven inches and a quarter: bill one inch and an eighth; wing five inches and a quarter; tail six inches and a half; tarsi three-quarters of an inch. (Gould.)

1369.—The Mexican Trogon

(*Trogon Mexicanus*). Old Male:—Beak bright yellow; throat and ear-coverts black, gradually blending with the green that covers the chest and the whole of the upper surface. Two middle tail-feathers green with black tips, the two next on each side wholly black; the three outer on each side black, with white tips; wings black, the whole of which, with the exception of the primaries, is finely dotted with grey; a crescent of white encircles the chest; breast, belly, and under tail-coverts fine scarlet; feet brown. Total length eleven to twelve inches; wing five inches and three-quarters; tail seven inches and three-quarters. Fig. 1370 represents (upper figure) a young male and (lower figure) a female.

Young Male:—Distinguished from the adult by the grey freckles on the wings being rather stronger, and more inclined to brown on the secondaries; by the extreme outer edge of the primaries being white; and by the tail being regularly barred with black and white, which character is most conspicuous on the outer edges.

Female:—Top of the head, throat, chest, and back dark brown, inclining to olive on the upper surface, and to rufous on the chest; across the chest an obscure band of light grey, the lower parts scarlet; wings black, slightly freckled with brown on the outer edges of the secondaries and shoulders; the outer edges of the primaries fringed with white; two middle tail-feathers chesnut-brown, tipped with black: the two next on each side wholly black; the remainder strongly barred with black and white for nearly their whole length; bill yellow, clouded with brown. (Gould.)

Locality.—North of Mexico.

1371.—The Resplendent Trogon

(*Trogon* [Calarus] *resplendens*). Male and Female.

Male:—Beak gamboge-yellow; head covered with long filamentous plumes, forming a rounded crest; from the shoulders spring a number of lance-shaped feathers, which hang gracefully over the wings; from the rump are thrown off several pairs of narrow flowing plumes, the longest of which in fine adults measure from three feet to three feet four inches; the others gradually diminishing in length towards the rump, where they again assume the form of the feathers of the back—these plumes, together with the whole of the upper surface, throat, and chest, are of a most resplendent golden green; the breast and under parts are of a rich crimson scarlet; the middle feathers of the tail black; the six outer ones white for nearly their whole length, their bases being black; feet brown. Total length from the bill to the end of the tail, twelve to fourteen inches; wing, eight to nine; tarsi, one; length of the longest plume, about three feet.

Female or Young of the year:—These have only rudiments of the long plumes, seldom reaching more than an inch beyond the tip of the tail; the feathers of the crest more rounded and not filamentous: feathers of the shoulders but slightly lanceolate; outer tail-feathers white barred with black, the centre ones black; whole of the chest, throat, and head obscure green, remainder of the upper surface bright green; breast and belly greyish brown; under tail-coverts fine scarlet; bill black. (Gould.)

It was of the brilliant feathers of these and other Trogons that the ancient Mexicans made their famous mosaic pictures. They were probably kept in one of the two houses which formed the Royal Menagerie of ancient Mexico, one of these houses being aprpopiated to birds which did not live by prey; the other to birds of prey, quadrupeds, and reptiles. Three hundred men, according to Cortes, were employed to take care of these birds, besides their physicians, who watched their diseases and applied timely remedies. Of the three hundred attendants, some procured their food, others distributed it, others took care of the eggs at the time of incubation; whilst others, at certain seasons picked their plumage—for the king not only delighted in the sight of so many species, but was very careful of their feathers for the sake of the works in the fabrication of which they were used.

Family MUSCICAPIDÆ (FLYCATCHERS).

The Flycatchers approximate in many points to the Todies; the latter indeed are placed by Mr. Swainson within the pale of this family, but not by Mr. Vigors, who regards them as distinct. It is to the dentirostral tribe that the Flycatchers belong. They are characterized by a depressed beak, broad at the base, and garnished with vibrissæ. The wings are more or less rounded. The smaller species live exclusively on insects, which they take on the wing, launching from a branch, or other post of observation, and, having effected their capture, wheeling abruptly round, and again settling on the same spot. Our spotted flycatcher may be regarded as typical of the family.

1372, 1373 (*a*).—The Spotted Flycatcher

(*Muscicapa grisola*, Linn.). This is the Gobemouche proprement dit of Buffon; Gobemouche gris of Temminck; Fliegenfänger and Gefleckter Fliegenfänger of the Germans; Stoparola of Aldrovandus and Ray; y Gwybedog of the ancient British; Spotted Flycatcher and (provincial) Beam-bird, Rafter, Post-bird, &c., of the modern British.

This pretty little bird is one of our summer visitors. On the Continent it is very extensively spread, advancing northwards even to the borders of the arctic regions. In our island it arrives in May, and departs at the close of September, or beginning of October, rearing, as far as we have been able to ascertain, only a single brood.

The flycatcher is retired in its habits, frequenting embowered retreats, shady gardens, orchards, and groves, where the foliage affords it concealment; not indeed that it is timid, for if not rudely disturbed, it will allow itself to be closely watched during the performance of its aërial evolutions in the pursuit of its insect food. It generally chooses for its perch and observatory the bough of a fruit-tree, or one of the lower branches of the elm, or other tree of tall growth; whence it takes short abrupt circling flights, returning to the same, or an adjacent twig. We have often observed these birds thus engaged, darting in chace of their prey at almost regular intervals, for half an hour together, and returning after each flight to the same post of observation.

The note of the flycatcher is a weak chirp, which is seldom uttered after the production of its young. The nest of this bird is built in different situations, as convenience may dictate; we have very frequently seen it between the branch of a trained fruit-tree and the wall, or in holes of the wall hidden by foliage. It will build also in the holes of aged gnarled trees, upon the ends of beams in outhouses, and in other appropriate places of concealment. The eggs are five in number, of a greyish white, marked with pale orange-brown spots. When the young are able to fly, the parents lead them to some branch, and supply them with food; but they soon learn to chase their own prey, and become expert and quick in the pursuit. Pennant and other writers state that the flycatcher is partial to cherries and other fruit; but this is unquestionably a mistake: we have had the opportunity of well investigating the habits of this bird, and soft insects, as far as our observations warrant, are its only food. We have, however, had several times to plead in its favour, for gardeners seem to think that all birds devour fruit, and frequent the garden principally for that purpose.

The spotted flycatcher is about the size of the redbreast. The crown of the head is brownish, obscurely spotted with a deeper tint; all the upper parts of the body are ash-brown or mouse-colour; the wings and tail more dusky. The whole of the under surface is white, the throat, chest, and sides being marked with narrow dashes of reddish brown.

1373 (*b*).—The Pied Flycatcher

(*Muscicapa luctuosa*). This is a rare British species, and though it has been supposed by some to be indigenous, is certainly a bird of passage; and Mr. Selby is inclined to consider the few individuals met with during the summer as birds driven out of the track of their polar migration, and he adduces the following fact in corroboration of his opinion:—"In May, 1822, after a very severe storm of wind and rain from the south-east, several of these birds made their appearance in Northumberland, and I procured specimens of both sexes, the males being in different states of progress towards the summer's plumage. As the weather continued cold for some days subsequent to their appearance, they were obliged to resort to dunghills and other warm situations for a supply of their natural food. After remaining for about a fortnight to recruit their strength, for at first they exhibited great weakness, they all disappeared, nor could I ascertain that a single pair remained in that neighbourhood during the season of incubation." Notwithstanding this, we believe this species purposely visits our island, though it is rare, and restricted to certain localities, principally in the midland counties. We once saw a pair in Cheshire. Colonel Montagu remarks that great numbers may be seen at Lowther Castle, Westmoreland, where it has bred for many years. They are said to arrive here about the middle of April. "The males, soon after their arrival, should the weather be favourable, will frequently sit for a considerable period on the decayed branch of a tree, constantly repeating their short, little varied, though far from unpleasant song, every now and then interrupted by the pursuit and capture of some passing insect. Their alarm note is not very unlike the word 'chuck,' which they commonly repeat two or three times when approached, and which leads to their detection."

According to Temminck, this species is very abundant in the southern provinces of Europe and along the coasts of the Mediterranean; it is found in the central parts of France and Germany, and also in Italy. In its manners it resembles the spotted flycatcher, and breeds in the holes of decayed trees, forming a nest of leaves, bark, and hay, lined with hair and feathers. The eggs are five in number, of a pale greenish blue. The moult of this bird is double, occurring in autumn and again in spring. In autumn the male assumes a livery like that of the female, but in spring he puts on a brighter dress; the forehead, and a band across each wing, occupying the greater coverts, are pure white, as is the under surface of the body; general plumage above, black. In the female (and male, in winter) the forehead is of a dull dirty white, and the upper parts are blackish grey. Length, five inches. This is the Gobemouche-becfigue of the French; and in October numbers are killed in the south of Europe for the table, together with an allied species, the Muscicapa albicollis.

1374.—The Fan-tailed Flycatcher

(*Rhipidura flabellifera*). Muscicapa flabellifera, Gmelin. This beautiful species is a native of New Holland, where it is very common. Mr. Caley says that it abounds about Paramatta, where he conjectures it to remain stationary throughout the year. It is insectivorous, and in its habits much resembles our spotted flycatcher. It frequents, says Mr. Caley, the small trees and bushes, from which it darts suddenly at its prey, spreading out its tail like a fan, and to appearance turning over like a tumbler pigeon, and then immediately returning to the same twig or bough from which it sprang. These actions it continues to repeat for a long time together. He adds that the skin is very tender, and that when taken off the body it is difficult to restore it to anything like proper form.

The general colour of this bird is brownish black; a stripe above the eye and a spot behind are white, as are the throat and points of the wing-coverts; the tail is long, ample, and rounded, and the lateral feathers composing it are more or less white, there being some degree of variation in the extent to which this colour pervades them. Under parts, ferruginous white. It is principally in the form of the tail and the length of the wings that the difference between the genera Rhipidura and Muscicapa consists.

1375.—The Nest of a species of Flycatcher.

This woven nest is figured by Le Vaillant in his 'Birds of Africa:'—"It is, I believe," he writes, "the nest of the Tchitrec (Muscicapa cristata, Latham); for though I have never captured the bird of this species on the nest, and am not therefore certain of the fact, my good Klass, a faithful, if not a profound observer, assured me that it was. In one of our journeys through a wood of mimosas, in the country of the Caffres, he discovered and brought me this nest, having seen, he said, and particularly observed a male and female tchitrec occupied in constructing it. It is remarkable for its peculiar form, bearing a strong resemblance to a small horn suspended with the point downwards, between two branches. Its greatest diameter was two inches, whence it gradually diminished." It was composed of a close and laboriously woven tissue of slender threads, taken from the bark of certain shrubs; the depth of the cavity for containing the eggs was not more than three inches; and beyond this extended the conical mass of felt.

To the group of flycatchers belongs the Kingbird of America (*Tyrannus intrepidus*), so celebrated for its spirit, and its daring attacks upon eagles, hawks, crows, &c., during the time of breeding, while the patient female is brooding over her eggs. We may also enumerate the genus Phænicornis, by some considered, and perhaps correctly, as belonging to the next family; as is also Tyrannus.

Family LANIADÆ (SHRIKES).

This family comprises a numerous and widely-dispersed assemblage of birds, all of insectivorous habits, and many of even carnivorous appetite; attacking small birds and quadrupeds, and displaying unexpected ferocity of disposition. The beak is strong, decidedly toothed, compressed laterally, and often hooked at the tip. The claws are fine and sharp. These birds take their prey, like the flycatchers, by darting suddenly upon it from some post of observation, and in other respects approach the Muscicapidæ, of which some of the groups, viz., Tyrannus and Phænicornis, &c., are by many naturalists placed within the pale of the Laniadæ, as we have already stated. Fig. 1376 represents the Head and Foot of the Lanius Excubitor, or Butcher-Bird, one of the typical species. Fig. 1377 represents the Head of one of the Drongo Shrikes (Tephrodornis superciliosus); and 1378 the Head of one of the genus Telophonus.

1379.—The Butcher-Bird

(*Lanius Excubitor*). This is the Castrica palombina and Averla maggiore of the Italians; the Pie Grièche grise and Pie grisâtre of the French; Tornskade of the Danes; Warfogel of the Swedes; Klavert of the Norwegians; the Berg-Aelster, Grossere Neuntoder, and Gemeine Würger of the Germans: Greater Butcher-Bird or Mattagess of Willughby, Mountain Magpie, Murdering Pie, Great Grey Shrike, Shreek, and Shrike of the modern British, and Cigydd Mawr of the ancient British.

This bird is only an occasional visitor to the British Islands. Mr. Selby observes, that by most British ornithologists it has been mentioned as arriving in spring, and departing in autumn, which would imply that it breeds in this country, and is a regular periodical visitant:—"from this view of its habits I must be permitted to dissent; all the specimens that have come under my observation having been killed in the months of November, December and January." We know not how to reconcile this with the following passage (by J. Rennie, Esq., A.M.) in the 'Library of Entertaining Knowledge—Architecture of Birds,' p. 3:—"A gentleman, who was fond of reading Buffon, and similar works on natural history, but who seldom looked into the great book of nature itself, expressed to us his doubts of the account originally given by Heckwelder of the Butcher-bird sticking insects on the point of a thorn, as a bait to allure small birds within its reach. He never thought, however, of disproving or ascertaining the circumstance, and was surprised beyond measure to be informed that at least one species of the Butcher-bird (Lanius Collurio) was as common in his immediate neighbourhood as the song-thrush, and therefore opportunities of observing its manners could not be wanting. To satisfy ourselves, as well as to settle the doubts of our friend, we undertook to watch the proceedings of the species just named, as also of the great Butcher-bird (Lanius Excubitor), both of which are so common that we found half a dozen of the nests of each within five miles of Lee, in Kent. We discovered that near those nests large insects, such as humble bees, and also that the unfledged nestlings of small birds, were stuck upon the thorns." Fig. 1380 represents the nest. For ourselves we have never seen the Lanius Excubitor in a state of nature, nor indeed were we aware that it was anywhere common in England, or that it bred here. In France and the middle and southern districts of Europe it is tolerably abundant, and does not appear to be a bird of true migratory habits. The butcher-bird feeds upon mice, shrews, small birds, frogs, lizards, and large insects. Its larger victims it kills by striking them on the head with its beak, and then either holding them in its sharp claws and pulling them to pieces, in the manner of hawks, or, as is most usual, fixing them on a thorn; it does the same with insects, not however to allure birds but to secure its prey. Mr. Selby says, "I had the gratification of witnessing this operation of the Shrike upon a hedge-sparrow (Accentor modularis) which it had just killed, and the skin of which, still attached to the thorn, is now in my possession. In this instance, after killing the bird, it hovered with the prey on its bill, a short time over the hedge, apparently occupied in selecting a thorn fit for its purpose. Upon disturbing it and advancing to the spot, I found the Accentor firmly fixed by the tendons of the wing to the selected twig." When kept in a cage the butcher acts in a similar manner, and twists his victim in the wires, so as to secure it while he tears it to pieces. We have seen the New Holland butcher-bird (Vanga destructor) in captivity act in the same manner, and after strangling a mouse, or crushing its skull, double it through the wires of its cage, and with every demonstration of savage triumph proceed to tear it limb from limb, and devour it. By way of digression we may here observe that this bird had the talent of imitation, and had learned to sing several bars of airs with a full-toned musical voice. It executed the first part of 'Over the Water to Charlie with a spirit that would have gone to the heart of an old Jacobite.

1381.—Vigors's Bush-Shrike?

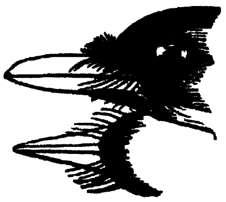
1380.—Nest of Butcher bird

1382.—Spotted Bush Shrike.

8.—Bill of Telophonus leucogrammicus.

1384.—Cunningham's Bush-shrike

1376.—Head and Foot of Butcher-bird.

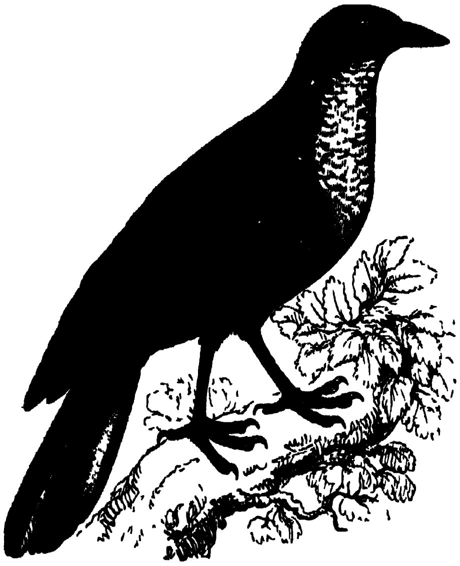


1377.—Head of Drongo Shrike.

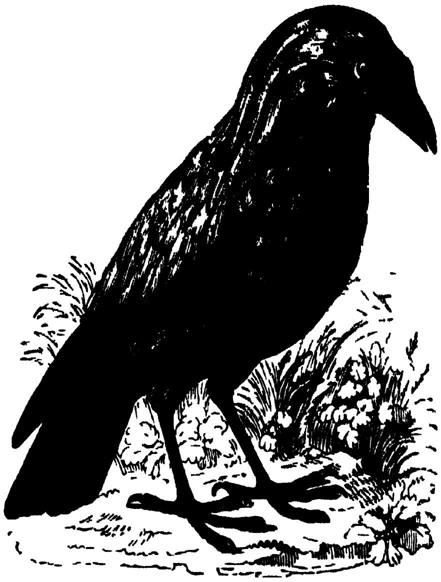
1383.—Cayenne Shrike.

1379.—Butcher-bird.

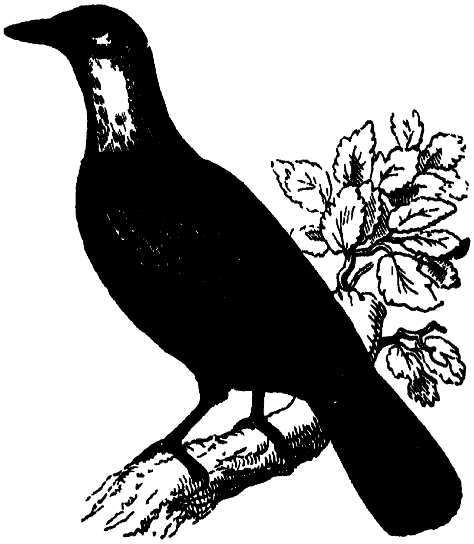
1385.—Pitohui.



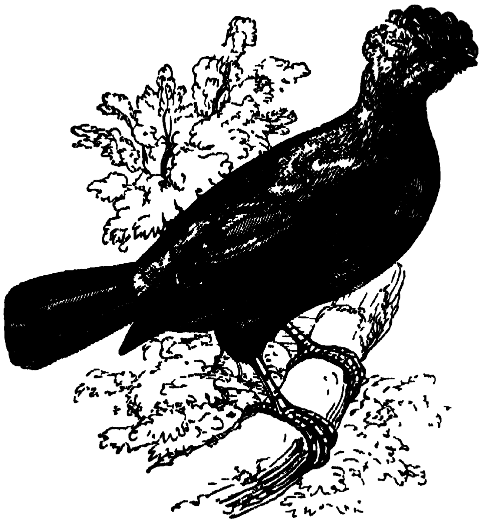
1386.—Scaled Fruit-Crow.



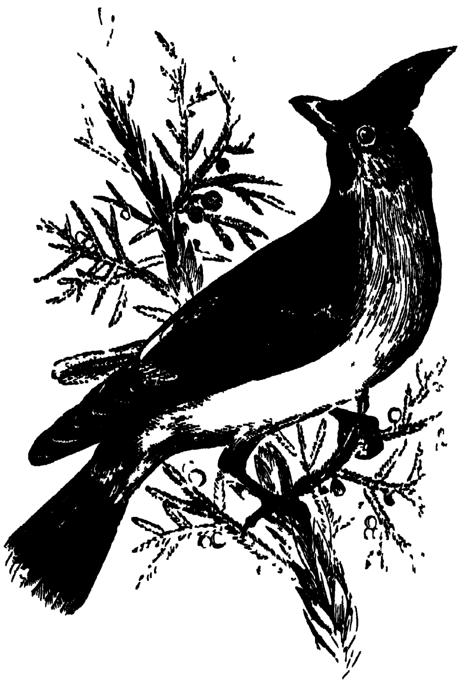
1387 —Bald Fruit Crow



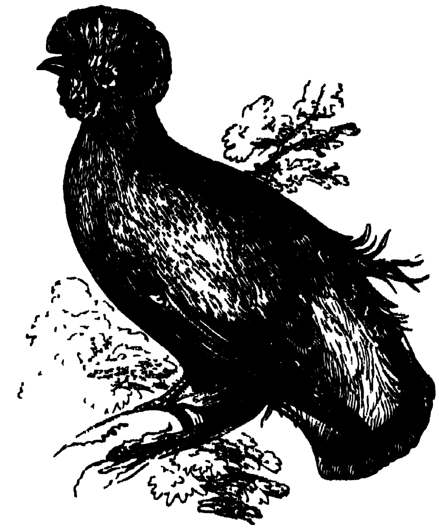
1388.—Bare necked Fruit-Crow.



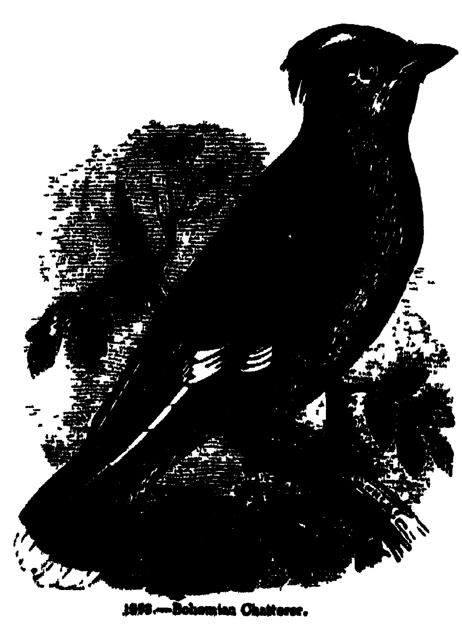
6391.—Peruvian Cock of the Rock.



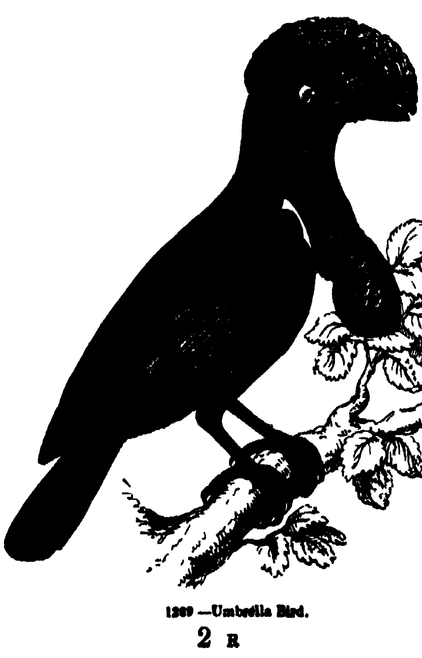
1394.—Cedar Bird.



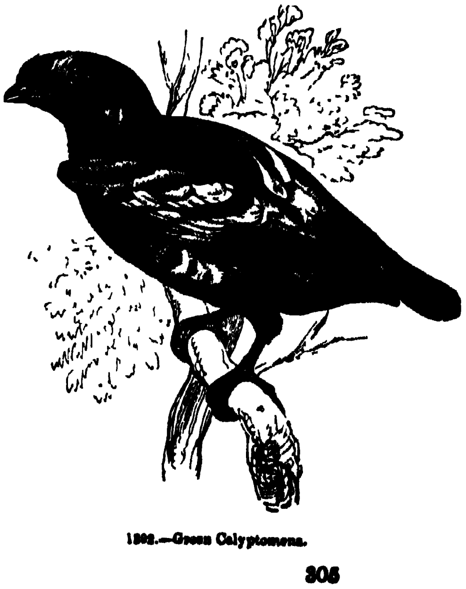
0 —Cock of the Rock



1393.—Bohemian Chatterer.



1389 —Umbrella Bird.



1392.—Green Calyptomena.

The term excubitor, or sentinel, was given to the butcher-bird by Linnæus, from its vigilance in watching against hawks and other birds of that tribe, whose approach it is ever the first to perceive, uttering at the same time a querulous chattering, indicative no doubt of fear and dislike. Hence on the Continent it is used by persons engaged in the capture of the Peregrine falcon. The mode is thus stated by Sir John Sebright, in his 'Observations upon Hawking:'—The slight or Peregrine falcons, he says, which are brought to this country in the spring, to be used in flying herons, are caught in the preceding autumn and winter on the heaths near Falconsweard, as they pass towards the south and east. These hawks are taken, he tells us, by placing in a favourable situation a small bow net, so arranged as to be drawn over quickly by a long string that is attached to it. A pigeon of a light colour is tied on the ground as a bait; and the falconer is concealed, at a convenient distance, in a hut made of turf, to which the string reaches. A butcher-bird (Lanius Excubitor), that is, the Warder butcher-bird, from the look-out that he keeps for the falcon, is tied on the ground near the hut; and two pieces of turf are so set up as to serve him as well for a place of shelter from the weather as of retreat from the falcon. The falconer employs himself in some sedentary occupation, relying upon the vigilance of the butcher-bird to warn him of the approach of a hawk. This he never fails to do, by screaming loudly when he perceives his enemy at a distance, and by running under the turf when the hawk draws near. The falconer is thus prepared to pull the net the moment that the falcon has pounced upon the pigeon.

The nest is generally built on trees, and is framed of grass-stalks, roots, and moss, with a lining of down or wool. The eggs, from four to six, or, according to Temminck, from five to seven, are bluish or greyish-white, spotted on the larger end with light brown and ash.

The colouring of the adult male is as follows:—Head, nape, and back fine bright ash; a large black band passing beneath the eyes and covering the orifices of the ears; lower part pure white; wings short, black; origin of the quills and extremity of the secondaries pure white; two external tail-feathers white; the third black towards the centre, the fourth terminated by a great white space, and the fifth by a less extensive space; the two middle ones entirely black; bill and feet deep black. Length nine or ten inches.

The young male resembles the female.

Female:—Upper parts less bright ash; lower parts whitish, each breast-feather terminated by a crescent of bright ash; less white at the extremity of the secondaries, and more black on the origin of the tail-feathers.

Total length, nine inches.

1381.—Vigors's Bush-Shrike

(*Thamnophilus Vigorsii*). The birds of this genus are natives of South America, and tenant wooded districts, lurking and prying among thick bushes and underwood, in quest of reptiles, nestlings, small birds, and mammalia; the beak is strong, and the upper mandible curved at the tip; the tarsi are long; and in one division of the genus the tail is produced to a considerable extent beyond the wings. To this belongs the Thamnophilus Vigorsii—a species of large size and predatory habits. The rounded wing and long tarsi indicate its adaptation to the localities it frequents, while its robust and hooked and compressed bill announces the nature of its food. This species is about thirteen inches in length: in the male, the back, wings, and tail are black, broadly banded with fulvous, and the under part of the body is of a dirty whitish brown; on the head is a rufous crest tinged with black at the apex; in the female the bands are whitish, the crest blackish, and the under parts ash-colour.

1382.—The Spotted Bush-Shrike

(*Thamnophilus nævius*). This species is an example of the division characterized by a comparatively short and rounded tail. The general colour of the spotted bush-shrike is black; the back being ash-coloured with dashes of white anteriorly; the wings are variegated also with white. The under parts of the body are ash-coloured. The habits of this bird much resemble those of the common butcher-bird; insects and small quadrupeds, &c. being its prey.

1383.—The Cayenne Shrike

(*Psaris Cayanensis*). Lanius Cayanus, Gmelin; Pie-grièche grise de Cayenne of Buffon. Bill large, thick, subcylindrical; tip abruptly bent, and notched. Head large, and depressed; wings long. The examples of the genus Psaris (Cuvier) are all South American; the present species is common in Cayenne, and, according to Cuvier, its manners are those of our European butcher-bird. General colour, fine ashy-grey; head, wings, and tail black.

1384.—Cunningham's Shrike

(*Gubernetes Cunninghami*, Vigors). The manners of this shrike resemble those of the preceding species; its flight is quick, and it preys upon large insects. Mr. Vigors observes that this bird, which he named after Colonel Cunningham of Rio Janeiro, appears to have a considerable affinity to the genus Psaris of Cuvier in the structure of its bill and wings, but that it differs from it by other such essential characters as to have induced him to place it in a separate genus.

General colour ash-grey, longitudinally lineated with brown; throat and rump white; a pectoral lunulate band of purplish-brown; wings and tail brownish-black. Quill feathers longitudinally banded with ferruginous.

1385.—The Common Piahau

(*Querula rubricollis*). Mr. Swainson observes that by some of the Linnæan writers this remarkable bird is classed as a Muscicapa; while by others, even among the moderns, it is considered an Ampelis; and he thinks that both of these opinions may be reconciled, by viewing it—as it stands in his arrangement—as the connecting link between these families. He remarks that all the other flycatchers, according to his system, so far as we yet know, feed entirely upon insects; but there is unquestionable testimony that this species lives also upon fruits, thus uniting in itself the characteristic of the two families which it connects. In the bill, he adds, there is much of the form and strength of that of Psaris, but it is wide and more depressed; whilst the stiff bristles at the rictus betray its insectivorous habit: the feet are remarkably short for the size of the bird, and are calculated only, like those of the Ampelidæ, for perching. All these characters, in the opinion of Mr. Swainson, not only point out this genus as the fissirostral type, but perfect the union of the families of Muscicapidæ and Ampelidæ.

Looking at its affinity to Psaris, we venture to place it, but with doubt, within the border-line of the Laniadæ. The Piahau, so called from its cry, is a native of America, living in troops, in the woods, and feeding on insects and fruits. Its general colour is black, with a purple throat. It is the Muscicapa rubricollis of Gmelin.

Family CORACINIDÆ.

The birds of this family, termed Fruit-Crows by Mr. Swainson, are regarded by that naturalist as constituting a subfamily of the Corvidæ (Crows). Lesson and others place the birds in question among the Chatterers (Ampelidæ); and Cuvier, who places them before the Ampelidæ, or, as he calls them, Cotingas, observes that they have certain links of affinity to some of the Flycatchers.

In their habits they appear to be arboreal, feeding upon berries: the beak is depressed and smooth, angular above; slightly curved at the point, which is minutely toothed; the lower mandible a little flattened below.

1386. The Scaled Fruit-Crow

(*Coracina scutata*). This beautiful bird is a native of the forests of Brazil; its general plumage is glossy black, with the exception of the throat and chest, which are of a fine rose-red. We have no particular details of its habits.

1387.—The Bald Fruit-Crow

(*Gymnocephalus calvus*); Corvus calvus, Latham; Capuchin Bald-head; Oiseau mon Père of the Creoles of Cayenne. This singular species, which constitutes the type of the genus Gymnocephalus, equals a crow in size; it is of the colour of Spanish snuff, or as some term it, a Capuchin colour, whence the Creole name Oiseau mon Père. The quills and the tail-feathers are black. The whole anterior part of the head is destitute of feathers; and from this circumstance and the size of the beak, the expression of the face, if the word face be allowed, is very remarkable. Both Le Vaillant and Vieillot assert that it is not until the bird is adult that the feathers of the head are lost, and that previously to this stage the whole is well covered, whence the latter author, noticing that on this account it has been compared to the rook, which loses the feathers around the base of its bill, adds that the comparison is just; for, like the rook, it has no part of the head naked until it has arrived at complete maturity. Lesson, however, seems to doubt the assertion of Vieillot, and states that he saw twenty specimens at Rochefort, all of which had the face bare of feathers; but it may be observed that in all probability the birds were adult, a point which Lesson seems to have disregarded. Locality, Guiana.

1388.—The Bare-necked Fruit-Crow

(*Gymnoderus fœtidus*); Col-nu, Buffon; Corvus nudus, Latham; Gracula nudicollis, Shaw; Gracula fœtida, Linn. In size this bird equals a jackdaw, but the body is thick and fleshy; the sides of the neck are entirely naked, presenting only a few traces of down. The upper part of the head, the back of the neck and throat, are covered with small close-set feathers, producing the appearance of black velvet. The wing-coverts and edges of the middle quill-feathers are of a bluish-grey; the rest of the plumage is black in the male, brownish-black in the female. Native regions, Brazil and Guiana.

1389.—The Umbrella-Bird

(*Cephalopterus ornatus*). This rare and beautiful bird is distinguished by a crest of full outspreading plumes which tower above its head and fall over the beak, reminding us of the crest of a Grecian helmet. From the upper part of the chest depends a sort of pelerine or apron of square-edged feathers; the tail is graduated; the bill is strong and robust; the whole of the plumage is jet-black, with rich violet reflexions, especially on the crest and chest plumes. The umbrella-bird equals a jay in size, but of its manners and habits nothing is known. It is a native of Brazil, and the borders of the Amazon and its tributary rivers. Lesson, indeed, in reference to the specimen in the Paris Museum, states that though the belief was that it came from Brazil, a well-informed Portuguese told him that it was brought from Goa (Malabar). We hesitate not to affirm that there is in this statement some mistake: if brought from Goa, it was first taken there, and thence to Lisbon, whence it was forwarded to M. Geoffroy St. Hilaire.

Family AMPELIDÆ (CHATTERERS).

Bill stout, variable in length; feet strong, the outer toe united to the middle toe as far or beyond the first joint. Food, chiefly berries.

1390.—The Cock of the Rock

(*Rupicola aurantia*); Rupicola Cayana, Swainson; Rupicola elegans, Stephens; Rupicola crocea; Rock Manakin. In the genus Rupicola the bill is moderate, robust, and vaulted above; the nostrils are oval, but hidden by an elevated fan-like crest, which covers the top of the head; the wings are moderate and rounded; the tail short and square.

The Cock of the Rock is a native of South America, tenanting the rocky districts along the rivers of Cayenne, Surinam, &c., and is probably to be found along the river Amazon and most of its tributary branches. Latham states that it is nowhere so frequent as on the mountain Luca, near the river Oyapok, in Guiana, and on the mountain Courouraye, near the river Aprouack, where it builds in cavernous hollows and dark recesses: the nest is made of twigs and dry herbage, and the eggs are two in number, of a white colour, and are equal in size to those of a pigeon.

In its habits and manners this beautiful bird is shy and recluse, resorting to silent glens and rocky ravines, where it appears to pass an undisturbed existence. Its flight is rapid; its food consists of berries and the smaller wild plants. Waterton informs us that it is found in the woody mountains of Macousia, a tract on the Apourapoura—one of the tributaries of the Essequibo from the south—and inhabited by the Macoushi (or Macusi) Indians, celebrated for their skill in preparing the urari, or deadly vegetable poison with which they smear the points of their arrows. This bird, he says, retires to hide in the daytime amongst the darkest rocks, and comes out to feed only just before sunrise and at the hour of sunset. Its disposition is gloomy and unsocial, and it never joins company with other birds of the forest. The Cock of the Rock is about the size of a pigeon; the general plumage is of a bright orange yellow or rich saffron; a compressed crest, like that of a Greek helmet, surmounts the head, and is varied along the summit with brown and yellow. The secondary quill-feathers and the tail-coverts are square, as if cut at the ends with a pair of scissors. The feathers of the back and the wing-coverts are elongated into loose flowing plumes; the tail is brown, tipped with yellow; the bill and tarsi rosy-white. The female is rather smaller than the male, with a less elevated crest, and of a uniform bistre brown. No living specimen, as far as we are aware, has ever been brought to Europe.

1391.—The Peruvian Cock of the Rock

(*Rupicola Peruviana*); Chiachia lacca of the Mexicans. This bird appears to be a native of the interior of Peru and Mexico, and specimens have been brought to Europe from Lima. For some time this species was regarded as a variety of the Rupicola aurantia, from which however it is perfectly distinct, being a larger bird, with a longer tail in proportion. Its crest is not compressed, nor are the feathers of the back and wing-coverts plumose and filiform, as in the former species. It differs also in colouring. The general tint is bright orange, but the quill and tail feathers are deep black, and the middle wing coverts are bright ash-grey. The crest is of a uniform tint, wanting the deeper-coloured semicircular line edging the helmet-like crest of the preceding. Of its habits and manners nothing is known, but we may safely infer that they resemble those of the Rupicola aurantia.

1392.—The Green Calyptomena

(*Calyptomena viridis*). In the genus Calyptomena the bill is depressed and wide at the base, curved or hooked at the point, and nearly hidden by the feathers of the crest, which is erect and compressed; the wings are ample; the tail is short; the middle and outer toes are connected as far as the second joint.

This beautiful and richly-coloured bird is about the size of a thrush, measuring about six inches and a half in length; it is a native of Singapore and the interior of Sumatra. We learn from Sir Stamford Raffles that it shrouds itself in the most retired parts of the forests, where it perches on the highest branches, and that from this circumstance and the blending of its emerald-green tints with those of the leaves, it is not to be easily discerned and procured. In the specimens which he examined the stomach contained nothing but vegetable substances, chiefly wild grains. It is termed Burong Tampo Pinang by the Malays. "The general colour of this bird is a brilliant metallic green. The head is rather large, and its feathers are directed forwards from each side, in such a manner as nearly to conceal the bill, giving the face a very peculiar appearance. A little above and before the eyes the feathers are of a deep velvet-black at their base, and only tipped with green, but crossed on the coverts by three velvet-black bands; the primary feathers, as well as the whole under-side of the wings, are dusky, approaching to black; with the exception of the outer margins of some which are edged with green. The tail is short, rounded, composed of ten feathers, which are green above and bluish-black below. The whole of the under parts are green: this colour is lightest on the sides of the neck and round the eyes. The bill is short, wide, much depressed at the base, deeply cleft, and hooked at the point. Nostrils oval at the base of the bill, and concealed by the filiform feathers that project over them. The eyes are rather large; the irides bluish. Legs bluish-black; a few feathers come down over the upper part of the tarsi. Feet gressorial; outer toe not much shorter than the middle one, with which it is united as far as the last joint. The female does not differ in appearance from the male." (Raffles.)

1393.—The Bohemian Chatterer

(*Bombycilla Bohemica*). This elegant species, which is known by the English name of the Waxen Chatterer, the Bohemian Wax-wing, and Silk-tail, is Le Jaseur de Bohême (Buffon, &c.), Grand Jaseur (Temminck), and Geay de Bohême of the French; Garrulo di Boemia of the Italians; Röthlichgrauer Seidenschwantz (Meyer), Europäischer Seidenschwanz and Der Gemeine Seidenschwanz (Bechstein) of the Germans; Garrulus Bohemicus of Gesner; Bombycilla, Schwenck; Ampelis, Aldrovand; Bombycilla of Brisson; Ampelis garrulus of Linnæus; Bombyciphora garrula, Brehm; Bombyciphora poliocælia of Meyer; Bombycivora garrula of Temminck; and Bombycilla garrula of Vieillot.

In addition to the nomenclature above given, the bird is said to be named by the Italians in some localities Becco-Frisone, in others Galletto del bosco, and by the bird-catchers of Bologna, Uccello del mondo novo; by the Germans, Zinzerelle, Wipstertz, Schnee-vogel, and Schnee-Leschke; and by those in the neighbourhood of Nuremberg, Beemerle and Behemle; by the Swedes, Siden-swantz; by the Bohemians, Brkoslaw; and by the Poles, Jebwabniezka and Jemiolucha.

The Bohemian Chatterer, or Wax-wing, is a rare and accidental visitor to our island, and that only during severe winters, when sometimes considerable flocks make their appearance and feed upon the hips of the dog-rose, the haws of the thorn, the berries of the mountain-ash, &c. These migratory visits to our island are, however, irregular; but on the Continent, in Norway and Russia, great numbers are seen every winter; and in northern Asia and the adjacent parts of Europe their migrations are regular. Numerous flocks pass through Scania in November, taking a southern direction, and return northwards through the same region in spring. In Germany and Bohemia, according to Bechstein, flocks are found along the skirts of the extensive forests. In France the Wax-wing is very rare, and also in Italy; though occasionally in the latter country large flights have made their appearance, and, according to popular superstition, a fatality attended their movements.

The Bohemian chatterer is not confined to Europe and Asia (where it extends from the western limits of the former to Japan); it is a native also of the northern regions of the American continent. It is common on the Athabasca river near the Rocky Mountains, and has been killed there in the spring, both by the Prince of Canino and Mr. Drummond, and Dr. Richardson observed it in the same season at Great Bear Lake, in lat. 65°, where a male, of which he gives a description, was shot on the 24th May of that year. "Specimens," writes Dr. Richardson, "procured at the former place, and transmitted to England by the servants of the Hudson's Bay Company, were communicated by Mr. Leadbeater to the Prince of Musignano, who has introduced the species into his great work on the birds of the United States. In its autumn migration southwards, this bird must cross the territory of the United States, if it does not actually winter within it; but I have not heard of its having been hitherto seen in America to the southward of the fifty-fifth parallel of latitude.

"The mountainous nature of the country skirting the Northern Pacific Ocean, being congenial to the habits of this species, it is probably more generally diffused in New Caledonia and the Russian-American territories, than to the eastward of the Rocky Mountain chain. It appears in flocks at Great Bear Lake about the 24th of May, when the spring thaw has exposed the berries of the Alpine arbutus, marsh vaccinium, &c., that have been frozen and covered during winter. It stays only a few days, and none of the Indians of that quarter with whom I conversed had seen its nests; but I have reason to believe that it retires in the breeding-season to the rugged and secluded mountain limestone districts, in the sixty-seventh and sixty-eighth parallels, when it feeds on the fruit of the common juniper, which abounds in these places." Dr. Richardson adds, that he observed a large flock of at least three or four hundred on the banks of the Saskatchewan, at Carlton House, early in May, 1827. They alighted in a grove of poplars, settling all on one or two trees, and making a loud twittering noise. They stayed only about an hour in the morning, and were too shy to allow him to approach within gunshot.

With respect to the summer breeding-places of the Waxen Chatterer in Europe and Asia, nothing is known. Temminck says that it is supposed to resort to the high northern latitudes, the regions within the Arctic Circle, but the Prince of Canino suggests that the extensive and elevated table-land of Central Asia is its principal rendezvous, whence it makes irregular excursions east and west, extending its journey according to the season or other causes. According to the same author, the Wax-wing in a state of nature is very social with its companions, the individuals of a flock exhibiting much kindness to each other, and caressing and supplying each other with food; their flight is rapid; they usually alight on trees, and when on the ground hop along very awkwardly. Bechstein reports that in captivity the Wax-wing is stupid, indolent, and voracious, refusing nothing eatable, such as potatoes, cabbage, bread, and fruit of all sorts, and that it is easily tamed. "Its song consists only of a weak uncertain whistling, a little resembling that of the thrush, but not so loud; while singing it moves the crest, but scarcely the throat; when angry, its strikes the feeding-trough violently with its beak." It may be taken in nooses, or in nets and traps baited with berries. Its flesh is said to be excellent.

The Bohemian Chatterer is about eight inches in length, and in contour approaches the starling. The general plumage is dull vinous ash, tinted with ferruginous red on the plumage and cheeks; the feathers of the head are prolonged into a beautiful crest; the throat, the feathers around the nostrils, and a stripe which passes from the beak to the back of the neck, are black. The primary quill-feathers are brownish black, each feather having a yellow line on its inner margin near the tip. The secondaries are tipped with white, each having the shaft prolonged and furnished with a small horny scarlet appendage, like a little flattish oval bead of red sealing-wax, whence the name "wax-wing." The tail is black, tipped with a yellow band. Beak and tarsi black. Irides reddish. The female is generally similar to the male, but the yellow of the wings is not so bright, nor are the wax-like appendages so large or so numerous.

1394, 1395.—The Cedar-Bird

(*Bombycilla Carolinensis*). This species is the Ampelis garrulus, var. β, of the 'Systema Naturæ;' Garrulus Carolinensis, Le Jaseur de Caroline, the Chatterer of Catesby; Turdus garrulus Carolinensis of Klein; Coquantototl of Hernandez; Avis Americana cristata, Xomotl dicta of Seba; Chatterer of Carolina of Edwards; Cedar-bird, Ampelis Americana, of Wilson; Recollect of the Canadian Voyageurs; Bombycilla Carolinensis of Brisson, Bonaparte, Audubon, and others. It is said to be found in the whole extent between Mexico and Canada, and parties are said occasionally to roam as far south as the forests of Guiana. In the United States it is a resident during the whole year, the northern and middle states being its more usual quarters in the summer, and the southern in the winter season. It is stated that the bird has been found on the north-west coast of America, but its northern boundary appears to fall short of that of Bombycilla Bohemica. Say saw it near Winnipeg river in latitude 50°, and Dr. Richardson states his belief that it has not been hitherto observed to the northward of the fifty fourth parallel. He says that Mr. Drummond saw several small flocks on the south branch of the Saskatchewan on the 27th June, and gives a description of a male killed there in lat. 52½° on that day, 1827. He adds, that it frequents the northern shores of Lakes Huron and Superior in summer.

The cedar-birds utter a feeble lisping sound, and "fly," says Wilson, "in compact bodies of from twenty to fifty; and usually alight so close together on the same tree, that one-half are frequently shot down at a time. In the months of July and August, they collect together in flocks, and retire to the hilly parts of the state, the Blue Mountains, and other collateral ridges of the Alleghany, to enjoy the fruit of the Vaccinium uliginosum, whortleberries, which grow there in great abundance, whole mountains for many miles being almost entirely covered with them; and where, in the month of August, I have myself found the cedar-birds numerous. In October they descend to the lower cultivated parts of the country, to feed on the berries of the sour gum and red cedar, of which last they are immoderately fond; and thirty or forty may sometimes be seen fluttering among the branches of one small cedar-tree, plucking off the berries.....In the fall, and beginning of summer, when they become very fat, they are in considerable esteem for the table; and great numbers are brought to the market of Philadelphia, where they are sold at from twelve to twenty-five cents per dozen. During the whole winter and spring they are occasionally seen; and about the 25th of May appear in numerous parties making great havoc among the early cherries, selecting the best and ripest of the fruit." Audubon says that they reach Louisiana about the beginning of November, and retire towards the middle districts in the beginning of March. "The holly," writes the author last quoted, "the vines, the persimon, the pride of China, and various other trees, supply them with plenty of berries and fruits, on which they fatten, and become so tender and juicy as to be sought by every epicure for the table."

In June, while cherries and strawberries abound, they become extremely fat, and about the 10th or 12th of that month disperse over the country in pairs to breed; sometimes fixing on the cedar (Juniperus Virginiana), but generally choosing the orchard for that purpose. The nest is large for the size of the bird, and is fixed in the forked or horizontal branch of an apple-tree, ten or twelve feet from the ground; and sometimes several nests are to be seen in the same vicinity.

Externally the nest is composed of fibres and coarse dry stalks of grass; the inside is lined entirely with very fine stalks of the same material. The eggs are three or four, of a dingy bluish white, thick at the great end, tapering suddenly, and becoming very narrow at the other, marked with small roundish spots, of black of various sizes and shades: and the great end is of a pale dull purple tinge, marked likewise with touches of various shades of purple and black. About the last week in June the young are hatched, and are at first fed on insects and their larvæ; but as they advance in growth, on berries of various kinds. "The female," says Wilson, from whose personal observation the foregoing facts are given, "if disturbed, darts from the nest in silence to a considerable distance; no notes of wailing or lamentation are heard from either parent, nor are they even seen, notwithstanding you are in the tree examining the nest and young . . . The season of love, which makes almost every other small bird musical, has no such effect on them; for they continue at that interesting period as silent as before."

Audubon states that these birds are "excellent fly-catchers, spending much of their time in the pursuit of winged insects, but yet without much vivacity or energy of action. They start from the branches and give chace to the insects, ascending after them for a few yards or moving horizontally toward them, perhaps rather farther than when ascending, and as soon as the prey is secured they return to the spot, where they continue watching with slow motions of the head. Towards evening this amusement is carried on for half an hour or an hour at a time, and is continued longer at the approach of autumn, the berries then becoming scarcer."

1402.—Diamond Bird.

1399.—Red and Black Manakin.

1401.—Crested Manakin.

1400.—Galeated Manakin.

1396.—Japanese Chatterer.

1395.—Cedar-Bird.

1397.—Scarlet Cotinga.

1403.—Yellow-cheeked Titmouse

1398.—Swallow Fruit-eater.

1405.—Black-cap Titmouse

1407.—Long-tailed Titmice and Nest.

1408.—Egg of Blue Titmouse

1406.—Long-tailed Titmice

1404.—Group of British Titmice.

The cedar-bird is about six inches and a half long; its plumage is soft and silky, and its head is ornamented with an erectile crest. General colour yellowish or fawn brown, fading into yellow on the abdomen, and yellowish white under the tail. Back and wing-coverts greyish brown. Throat and a band passing from the forehead to the occiput black, the latter narrowly margined with white. Quill-feathers brownish black, some of the secondaries having the scarlet waxen appendages; tail brownish black, tipped with a band of pale yellow. The female is rather smaller than the male, and with paler colouring.

1396.—The Asiatic or Japanese Chatterer

(***Bombycilla phœnicoptera***). This newly discovered species differs from the Bohemian and the cedar-bird in the nakedness of the nostrils, in the length of the crest, partially composed of black plumes, and in the entire absence of the wax-like appendages with which in the other two species the secondaries are tipped.

The Japanese islands, as far as we know, appear to be native territories of this bird, which is found more particularly in the neighbourhood of Nangasaki. Of its habits we have no definite details. Length six inches and a half. The base of the bill is bordered by a black band, which passes to the back of the head, surrounding the eye in its way, and terminates in the lower crest-feathers, which are of the same colour throughout; the chin and throat are black; the crest is long, composed above of feathers of an ashy-reddish colour with an inferior layer of the black plumes already alluded to; the breast, upper parts, and wing-coverts are of a brownish-ash, and a red band traverses the wing about the middle of it; all the quills are of an ashy-black, the greater quills terminated with black and tipped with white; the tail is of an ashy-black, tipped with vivid red; the middle of the belly is of a whitish-yellow; and the lower tail-coverts chestnut; feet black.

Family PIPRIDÆ (COTINGAS and MANAKINS).

Mr. Swainson regards the Pipridæ, or, as he calls them, Piprinæ, as a subfamily of the Ampelidæ, from which they differ in the slenderness of the feet, shortness of the beak, and curvature of the upper mandible; most are of small size, and clothed in plumage of the richest tints of crimson, orange, yellow, blue, green, and black. The warmer regions of America are their strongholds, but not their exclusive *habitat*. According to Mr. Swainson the manakins "chiefly occur in the deep virgin forests of the tropics, but are much more social than the Cotingas. They live in little bands, are continually in motion, and feed almost entirely on the large soft berries of the different species of Melastoma: the nest of one species, Pipra pareola, is often built in the fork of a shrub, in such an exposed manner that the female can look all round, and watch the approach of danger; we found one in such a situation in the forest of Pitanga, a single leaf of a large pepper-plant (Piper) forming a kind of umbrella shade over the female, which was sitting, and did not rise from her nest as we passed onwards."

1397.—The Scarlet Cotinga

(***Phœnicircus Carnifex***). Ampelis Carnifex, Linn. In this genus the bill is rather weak; the wings are short and rounded; the feet are short, the middle and outer toes united, and the tarsi feathered on their inner side. The scarlet cotinga equals the wax-wing in size, and is a native of Brazil, Guiana, and Surinam. It tenants the deepest recesses of the forest, and is solitary in its habits, uttering from time to time a monotonous whistle which sounds like the syllable "quet." Waterton states that it is found throughout the year in Demerara, and is fond of the seeds of the lutea-tree, and of those of the siloabali, which ripen in December, and continue on the trees for above two months. Nothing, however, is known of the incubation of this splendid bird, and the Indians all agree in stating that they have never seen its nest. The Caraibs term it Arara and Apira.

The general colour of this species is fire-red, with a bright flaming-red cap; the back is reddish-brown, the breast blood-red; the tail feathers are purple terminated by ruddy black. The female is paler, and the tints more dusky and obscure.

1398.—The Swallow Fruit-eater

(***Procnias ventralis***). This beautiful species is a native of Bahia, and more particularly of the southern provinces of Brazil, where it frequents the woods, feeding on berries and wild fruits. The genus Procnias, of which it is an example, is characterized by the breadth of the beak, which has the sides inflected and the tip straight, the gape being remarkable for width, exceeding that even of the swallow tribe, and enabling the birds to swallow the large berries of the Melastoma and of other tropical shrubs with the greatest ease. Cuvier, speaking of these birds, says, "ils se nourissent d'insectes," but incorrectly, for fruits are their only food. Perhaps this genus rather belongs to the Ampelidæ than the Pipridæ.

The Swallow fruit-eater is about five inches and a half in length: the male is blue, with the anterior part of the head and the throat black; the sides are transversely striated with dusky black; and the centre of the abdomen is white. The female is green, with the forehead and throat grey; and the under parts yellowish, transversely striated with dusky green. To this genus belongs the Bell-bird, or Campanero, of South America, remarkable for its note, which sounds like that of a bell through the depths of the forests, recalling to the weary traveller the remembrance of a far-off land, and suggesting to his mind the beautiful words of Shakspere:—

> "True is it that we have seen better days,
> And have with holy bell been knoll'd to church."
> *As You Like It.*

till, carried away by his thoughts, he almost starts to find himself in the gloom of an American forest. "The campanero," says Waterton, "is about the size of the jay; his plumage is as white as snow; on his forehead rises a spiral tube nearly three inches long; it is jet black, dotted all over with white feathers, and has a communication with the palate, and when filled with air looks like a spire; when empty it becomes pendulous. His note is loud and clear, like the sound of a bell, and may be heard at the distance of three miles. In the midst of these extensive wilds, generally on the dried top of an aged mora, almost out of gun-reach, you will see the campanero. No sound or song from any of the winged inhabitants of the forest, not even the clearly pronounced 'Whip-poor-Will' from the goatsucker, cause such astonishment as the toll of the campanero. With many of the feathered race, he pays the common tribute of a morning and evening song; and even when the meridian sun has shut in silence the mouths of almost the whole of animated nature, the campanero still cheers the forest; you hear his toll, and then a pause for a minute—then another toll, and then a pause again—and then a toll, and again a pause—then he is silent for six or eight minutes, and then another toll, and so on." Strange to the ear, and not less welcome, must be the bell-like tone of the snow-white campanero.

1399.—The Red and Black Manakin

(***Pipra aureola***). The true manakins are very numerous, and all of minute size and beautifully coloured: they associate in small flocks; frequenting fruit-bearing trees in the woods, and are very active and alert. The bill is small and weak; the wings rounded; the tail short. The present species is of a rich red, with the exception of the back, wings, and tail, which are black, and of the throat, which is yellow. Locality, Guiana.

1400.—The Galeated Manakin

(***Metopia galeata***, Swains.); Pipra galeata, Licht. In this species the tail is broad and lengthened, and the wings ample; a frontal crest projects over the beak. The general colour is black; the whole of the head and back of the neck being of a rich crimson. It is a native of Brazil.

1401—The Crested Manakin

(***Calyptura cristata***). Bill short, strong, robust, and with the upper mandible deeply notched. Wings short and rounded; tail almost concealed; tarsi lengthened.

The general colour of this species on the upper surface is brownish-green or olive; the crown is red; the rump yellow; the throat and breast yellowish, this becoming brighter and more decided on the abdomen; tarsi black. Native country, Brazil.

1402.—The Diamond-Bird

(***Pardalotus punctatus***). In the subgenus Pardalotus the beak is stout, and notched as in Calyptura, but the wings are long and pointed. The feet are strong, and the lateral toe is free.

This pretty little bird is a native of Australia, where it inhabits the forest and brush-lands, but is not very abundant. The general colour above is grey, undulated with yellow; the head and wings are black dotted with white; a white streak runs above the eye; the lower part of the back is fire-red; the throat is yellow; the under parts whitish. The female has the head dotted with yellow points. It is from the spots on the wings that the settlers have given to this species the name of diamond-bird.

Family PARIDÆ (TITS, or TITMICE).

The birds of this family, of which our British species the Parus major and the Parus cæruleus may be regarded as typical species, are remarkable for their activity among the branches of trees, which they traverse with the utmost address, creeping around them, and clinging in all positions while they examine buds, bark, flowers, and fruits, in quest of insects and their larvæ, prying into every recess and crevice. Who has not observed their restlessness—their ever-changing attitudes—their quickness, their abrupt movements, their promptness and celerity? They frequent gardens, orchards, farm-yards, hedge-rows, and copses, and are bold and familiar. In addition to insects, they feed upon hard seeds and grain, and some will even attack the young of small birds, killing them by blows upon the skull with their short sharp-pointed beak. The colours of the titmice are lively and well contrasted, and the plumage is full and soft.

In the restricted genus Parus the bill is strong, short, subconical, slightly compressed, hard, and pointed. The nostrils are basal and round, covered with reflected bristly feathers. The outer and middle toes are not united; the hind-toe is strong, and armed with a long and hooked claw. Wings rounded. This form is almost universally spread.

1403.—The Yellow-Cheeked Titmouse

(***Parus Xanthogenys***). This species, which is a native of the Himalaya Mountains, was first described and figured by Mr. Gould in his 'Century of Birds, &c.' It is closely related to our Parus major, which it is said to resemble also in its habits and manners. The head is ornamented with a crest of black feathers, covering the whole of the top; a stripe above the eye; the cheeks are yellow; the ear-coverts black; the back is olive; the wings and tail black, the former being spotted and the latter tipped with white; a broad black mark passes down the throat and chest; the sides of the chest and flanks are pale yellow. Bill and feet black.

1404.—A Group of British Titmice.

In this pictorial group we have specimens of the following:—*a*, the Greater Tit (Parus major); *b*, the Blue Tit (Parus cæruleus); *c*, the Cole-Tit (Parus ater); *d*, the Marsh-Tit (Parus palustris).

1404 (*a*).—The Greater Tit

(***Parus major***); Mésange charbonnière, Temm.; Great Titmouse or Ox-eye, 'British Zool.' This beautiful bird frequents gardens, orchards, and copses, where in spring may be frequently heard its harsh note, aptly compared to the sound produced on sharpening the teeth of a saw by the file. This note is only heard during the pairing season, and ceases when the bird has a nest. Its ordinary cry is a loud chirp followed by a harsh clatter, remarkably strong for so small a bird, as it may be heard at a considerable distance. It uses, however, a great variety of calls, or notes, of which one resembles the call-note of the chaffinch, sounding like the word *pink*.

The Greater Titmouse feeds upon insects and their larvæ, which it digs out of crevices in the bark of trees, or extricates from buds in which they have made a lodgment. In autumn and during winter it subsists upon grain and seeds, preferring such as are of an oily quality. It will also pick bones, and is partial both to the flesh and fat, which it greedily devours. It will also disarrange the thatch of out houses and other buildings in quest of torpid insects. "The Great Titmouse (says Gilbert White), driven by stress of weather, much frequents houses; and in deep snows I have seen this bird, while it hung with its back downwards, to my no small delight and admiration, draw straws lengthwise from the eaves of thatched houses, in order to pull out the flies that were concealed between them, and that in such numbers that they quite defaced the thatch, and gave it a ragged appearance." It is capable of piercing the shells of nuts, of the kernels of which it is fond. Mr. Slaney says, "We had often in winter heard a humming noise, which appeared to be caused by this bird, and throwing a stone smartly at him, he dropped something, which proved to be a hazel-nut, a little perforated at the smaller end by repeated strokes of his bill. We often afterwards watched him at work, and found under his workshop many shells from which the nuts had been extricated, and some split into halves. It is said that if a nut be suspended at the end of a string, the titmouse will fix himself on this nut, and follow all its oscillations without ceasing to hack it with his bill."

Mr. Rennie observes that this species, when going to sleep, rolls itself into a round ball, erecting every feather so as not to separate its point from the adjoining ones. The quantity of non-conducting surface is by this means increased to the depth of nearly half an inch more than it is when the feathers are laid flat and smooth; and as the feathers of the belly are at the same time spread over the feet, the little creature is admirably protected from the cold."

The Greater Titmouse breeds in the holes of ruins walls and buildings, or in the holes of decayed trees, which it either makes or enlarges with its hard pointed bill, and rapidly accomplishes its task. The nest is placed in an enlarged space at the bottom, and is composed of moss, hair, and feathers. The eggs are six or eight in number, of a white colour spotted with reddish brown.

The colours of this beautiful species are well contrasted. The head, throat, and lower part of the neck are black; the cheeks and ear-coverts white. On the nape of the neck is a spot of white; back olive-green, passing at the lower part into bluish-grey. Wing-coverts bluish-grey tipped with white. Quill-feathers greenish-grey, as are those of the tail. Under parts sulphur yellow, with a black central stripe continued from the throat. Bill black; legs bluish-grey. In the female the tints are less rich. Length about six inches.

1404 (*b*).—The Blue Titmouse

(*Parus cæruleus*). Provincial, Tomtit, Nun, Blue-cap, Hickwall, Billy-biter; Le Mésange à tête bleue, Cuvier; Blaumeise, Bechstein. This beautiful little species is very common, and too well known to need a detailed description. It frequents gardens and orchards, and while engaged in its search for insects assumes among the twigs and sprays the most amusingly varied attitudes. It is very fond of flesh, fat, and suet, and we have known it a regular visitor to pigsties. Gilbert White says that when a boy he has known twenty of these birds caught in a morning, by means of snap mousetraps baited with suet; we have ourselves often captured it in a common brick trap baited with bits of meat and bread and butter. It is partial to oleaginous seeds, and will feed on those of the sunflower, and also, as White asserts, pick holes in apples left on the ground. Like the preceding species, it will disturb the thatch of buildings in quest of insects, and will even attack other small birds. In winter the Blue Titmouse resorts to stack-yards, where it finds both food and shelter, nestling at night in holes about the sides or under the thatching of hay or corn stacks, and, as we can personally testify, puffing up its feathers so as to resemble a ball of down. This species lives in holes of trees or walls, and forms its nest of mosses lined with feathers and hair; its eggs, from six to eight in number, are white spotted with brown, especially at the larger end (Fig. 1408). These birds resolutely defend their nest against intruders, and if an attempt be made upon it, bite with great severity, ruffling up their soft full plumage, and hissing like a snake or angry kitten, thereby often deterring the schoolboy from carrying his intentions into effect. The call-notes of the Blue Titmouse are confined to a weak chirp and kind of harsh chatter.

1404 (*c*).—The Cole-Tit

(*Parus ater*, Colemouse); La Petite Charbonnière, Buffon; Tannemeise, Bechstein. The Cole-tit is spread over Europe, particularly where pine-forests abound; in England it is comparatively rare, but in Scotland is very common, frequenting the extensive woods and plantations of pine, fir, &c., which seem everywhere to be its favourite if not exclusive habitat. In these woods it finds a secure retreat, and abundance of food, consisting of aphides and the larvæ of insects, as well as of seeds and berries. In its quick abrupt movements, its restlessness, and its ever-changing attitudes, this bird resembles the Blue Titmouse; and it seeks for its food among the branches with the same address. Its call-note in the spring, which resembles that of the greater titmouse, excepting that it is shriller, may be heard incessantly through the solitudes of the woods till the labour of nidification commences; the bird is then silent. The nest is built in the hollow of some decayed tree, and is neatly formed of moss and wool with a lining of hair. Mr. Selby states that he has sometimes found it on the ground in the entrance of a mouse or mole-hole. The eggs are from six to eight in number, of a white colour spotted with reddish-brown. The Cole-tit is very similar to the blue titmouse in form, but is even less in size, being about four inches in length; the bill is black, as are the crown and nape of the neck, the latter having a white central spot; the throat and under part of the neck are also black; the back is greenish-grey, passing on the lower part into yellowish-grey; the wings and tail are grey; under parts greyish-white; legs bluish-grey.

1404 (*d*).—The Marsh-Tit

(*Parus palustris*); Mésange nonnette, Temminck; Sumpfmeise, Bechstein. The Marsh-tit is very like the Cole-tit in form and colouring, but is larger, and has no white mark on the nape of the neck. It is common in the northern parts of England, but is seldom seen in Scotland above Fifeshire, and scarcely ever so far south as London. Although it may be sometimes met with in the woods of dry districts, it is more frequently to be met with among the reeds in low marshy tracts, where it makes its nest, generally choosing some decayed willow for a foundation. Its food is chiefly insects, but in winter it feeds on seeds, and is often tempted to visit the farm-yard for pieces of meat, which it eats with much avidity; indeed its appetite is so great, that it has been known to consume more than half its own weight of food per day. The Marsh-tit is also known provincially as the smaller Ox-eye, Willow-biter, Joe Bent, &c. When their haunts can be approached so as to witness their movements (which is not always an easy matter, as they generally select some long tract of marshy country on the banks of rivers, &c.), the observer will be repaid by a very interesting sight. They dwell together in considerable numbers, and are perpetually in motion, going in and out of their nests, feeding their young, flying off in search of food, or seeking for it in the crevices of the neighbouring trees. It is truly gratifying to witness their sprightly gambols, and the entertaining positions into which, as it were in very exuberance of spirit, they are continually throwing themselves.

This bird is very common in Holland. The nest is composed of moss, mixed with the seed-down of the willow, and lined with a warm coating of the same material. The eggs, six or eight in number, are spotted with reddish brown, particularly at the larger end.

Head, nape of neck, and throat ink black; upper-parts yellowish-grey, wings and tail bluish-grey edged paler; cheeks yellowish white; breast and under parts white, tinged with pale yellowish-brown; legs bluish-grey.

The tits we have hitherto described are very generally to be found in England; but the Crested Tit (P. cristatus), which we now proceed to notice, is a bird but seldom seen in this country, and very rare throughout Europe. It is distinguishable from the other tits by its crest, formed by its occipital feathers being elongated, pointed, and slightly recurved. It is in length about four inches and a half, of a dusky colour, with a black band round the neck; breast pinkish-white; feet of a leaden colour; and forehead black. It is common in the woods in the northern part of the middle division of Scotland, but in the other parts of Great Britain it is, as we have said, very rare. In North America, however, it is more frequently found. It is very solitary, very courageous in defending itself and its nest, and is very difficult to tame. Though not strictly migratory, it often shifts its quarters, and in severe winters visits the more southern parts of the kingdom.

1405.—The Black-Cap Titmouse of America

(*Parus atricapillus*); Mésange à tête noire de Canada, Buffon. Many ornithologists, and among them Temminck, have considered this bird to be identical with the Marsh-titmouse of Europe. It is now, however, universally agreed that the two birds, though nearly allied, are distinct species.

The Black-cap Titmouse is termed Peechehkeeskæshees by the Cree Indians, and, according to Nuttall, Chicadee by the European colonists. It ranges through the whole width of the American continent from latitude 65° to the southern districts of the United States, being stationary throughout the year. It is one of the most common birds in the fur-countries, a small family inhabiting every thicket. In the United States it is universally distributed.

"In these countries," says Nuttall ('Man. of Ornith. of United States and of Canada'), "families of Chicadees are seen chattering and roving through the woods, busily engaged in gleaning their multifarious food, along with the Parus bicolor, nuthatches, and creepers, the whole forming a busy, active, and noisy group, whose manners, food, and habits bring them together in a common pursuit. Their diet varies with the season; in the month of September they leave the woods and assemble familiarly in our orchards and gardens, and even enter the thronging cities in quest of that support which their native forests now deny them. Large seeds of many kinds, particularly those which are oily, as the sun-flower, and pine, and spruce-kernels, are now sought after. These seeds, in the usual manner of the genus, are seized in the claws and held against the branch until picked open by the bill to obtain their contents. Fat of various kinds is also greedily eaten, and they regularly watch the retreat of the hog-killers, in the country, to glean up the fragments of meat which adhere to the places where the carcasses have been suspended. At times they feed upon the wax of the candle-berry myrtle (Myrica cerifera); they likewise pick up crumbs near the houses, and search the weather-boards and even the window-sills familiarly for their lurking prey, and are particularly fond of spiders and the eggs of destructive moths, especially those of the canker-worm, which they greedily destroy in all its stages of existence. It is said that they sometimes attack their own species when the individual is sickly, and aim their blows at the skull with a view to eat the brain; but this barbarity I have never witnessed. In winter, when satisfied, they will descend to the snow-bank beneath, and quench their thirst by swallowing small pieces; in this way their various and frugal meal is always easily supplied; and hardy, and warmly clad in light and very downy feathers, they suffer very little inconvenience from the inclemency of the seasons. Indeed in the winter, or about the close of October, they at times appear so enlivened as already to show their attachments, the male approaching his mate with fluttering and vibrating wings; and in the spring season the males have obstinate engagements, darting after each other with great velocity and anger. Their roost, I suspect, is in the hollows of decayed trees, where they also breed, laying their eggs merely in the dry rotten wood, without any attempt at a nest; these are from six to twelve in number, white with specks of brown-red. They begin to lay about the middle or close of April, and though they commonly make use of natural or deserted holes of the woodpecker, yet at times they are said to excavate a cavity for themselves with much labour. The first brood take wing about the 7th or 10th of June, and they have sometimes a second towards the end of July. The young, as soon as fledged, have all the external marks of the adult; the head is equally black, and they chatter and skip about with all the agility and self-possession of their parents, who appear, nevertheless, very solicitous for their safety. From this time the whole family continue to associate together through the autumn and winter.

The colouring of the black-cap tit is as follows:—Top of the head, back of the neck, and the throat velvet black, a white line from the nostrils through the eye spreads out on the side of the neck; back lead-coloured, glossed with yellowish-grey; quill and tail-feathers blackish-grey edged with greyish-white; under plumage brownish-white; bill black; legs bluish. Total length five inches and a half.

1406, 1407.—The Long-tailed Titmouse

(*Orites caudata*, Mœhr); Mechistura caudata, Leach; Parus caudatus, Ray. This species is the Pendolino, Paronzino, Codibugnolo, and Paglia in culo of the Italians; Mésange à la longue queue and Perd sa queue of the French; Lanschwänzige Meise, Schwanzmeise, and Belzmeise Pfannenstiel of the Germans; Staartmees of the Netherlanders; Alltita of the Swedes; Jenga of the Japanese; Bottle Tit, Bottle Tom, Long-tailed Farmer, Long-tail Mag, Long-tail Pie, Poke-Pudding, Huckmuck, and Mum-ruffin of the modern British; and Y Benloyn gnyffonhir of the ancient British.

The Long-tailed Titmouse is distributed through the whole of Europe and the middle districts of Asia to Japan. It inhabits the British Islands. The food of this pretty bird consists of insects, their eggs and larvæ, for which it is in constant search among the branches, displaying the greatest alertness and address, hanging in every attitude from the ends of the twigs, and creeping mouse like round the thicker branches. It is not often that this bird is seen in the immediate vicinity of houses; and this circumstance did not escape the notice of Gilbert White, who states that it never retreats for succour in the severest seasons to houses and their neighbourhood. This does not arise from any peculiar shyness; and though it may not resort, like the Blue Titmouse, to the haunts of man for food and shelter in winter, it does not positively avoid them in summer. A writer in the 'Penny Cyclopædia' says—"We have seen in a nursery garden in Middlesex a whole family of them within a few yards of the nurseryman's cottage, and close to his green-house, which visitors were constantly entering; and we have found its exquisitely-wrought nest in a silver-fir about eight feet high, in a pleasure-ground in the same county, little more than a hundred yards from the house." Pennant well describes its appearance in flight when, after stating that the young follow the parents the whole winter, he says, "From the slimness of their bodies and great length of tail, they appear while flying like so many darts cutting the air. They are often seen passing through our gardens, going progressively from tree to tree, as if on their road to some other place, never making any halt." This progression is remarkable. We have ourselves followed a troop pretty closely, completely round the tall hedge-row of a large field, admiring their quickness and evolutions among the twigs and branches.

The nest of the long-tailed titmouse is a most beautiful and elaborate piece of workmanship, "combining beauty of appearance with security and warmth. In shape it is nearly oval, with one small hole in the upper part of the side, by which the bird enters. I have never seen more than one hole. The outside of this nest sparkles with silver-coloured lichens adhering to a firm texture of moss and wool, the inside profusely lined with soft feathers. The nest is generally placed in the middle of a thick bush.

1413 – Black Titmice.

1411.—Bearded Titmice

1409 —Nest of Long tailed Titmouse.

1410 —Nest of Long tailed Titmouse

[illegible].—Group of British Warblers.

412.—Penduline Titmice and Nest.

1420.—Garden Warbler.

1417.—Black-cap.

1418.—Black-cap.

1419.—Egg of Black-cap.

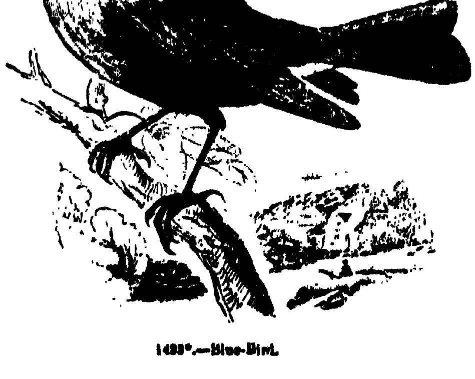
1423.—Mountain Short-wings.

1422.—Wheat-ears.

1421.—Whinchats.

1416.—Nightingale.

1415.—Nightingale


1423*.—Blue-Bird.

and so firmly fixed that it is mostly found necessary to cut out the portion of the bush containing it, if desirous of preserving the natural appearance and form of the nest. The female is the nest-maker, and is known to have been occupied for a fortnight to three weeks in completing her habitation. In this she deposits from ten to twelve eggs; but a larger number are occasionally found : they are small and white, with a few pale red specks, frequently quite plain. The young family of the year keep company with the parent birds during their first autumn and winter, and generally crowd close together on the same branch at roosting-time, looking, when thus huddled up, like a shapeless lump of feathers only. These birds have several notes, on the sound of which they assemble and keep together: one of these call-notes is soft and scarcely audible; a second is a louder chirp or twitter; and a third is of a hoarser kind." Figs. 1409 and 1410 represent the nest.

The colouring of this species is as follows:—Head, neck, throat, and breast pure white; the back and the six middle tail-feathers deep black; scapulars reddish; belly, sides, and abdomen reddish-white; quills black; greater wing-coverts bordered with pure white; lateral tail-feathers white on their external barbs and at their end; tail very long and wedge-shaped. Length five inches seven or eight lines.

1411.—The Bearded Titmouse

(*Calamophilus biarmicus*). Parus biarmicus. This is the Mésange Barbue ou Moustache of the French; Bartmeise of the Germans; Least Butcher-Bird of Edwards; Reed Pheasant (provincial) of the modern British; and Y Barfog of the Welsh.

M. Temminck remarks that the Zahnschäblige Bartmeise of Brehm is a species or subspecies founded only on individuals which have been long caged, such as may be seen in the Dutch markets, where numbers are sold. Some of these captives come to London, where they may be bought for some four or five shillings a pair. The iris and bill in the living bird are of a delicate orange-colour.

The bearded titmouse is a native of most parts of Europe; having, however, a partial distribution, from the circumstance of its affecting reed-beds and marshes. Hence it is abundant in Holland, and in the marshes of Ostia, Italy. It occurs along the shores of the Caspian Sea. In our island it has been found in reed-beds in Surrey, Sussex, Essex, Kent, along the banks of the Thames between London and Oxford, and in the fens of Lincolnshire, Cambridgeshire, Suffolk, and Norfolk. The food of this bird consists of insects, the seeds of various grasses, and especially of small fresh-water shelled snails; and it is remarkable that the sides of the stomach in this bird are thick and muscular, and formed into a gizzard, which is not the case in the true Tits, whence is afforded the power of breaking down the shells of the testaceous mollusks, Succinea amphibia and Pupa muscorum, which are greedily devoured.

According to Mr. Hoy the bearded tit begins building towards the end of April, and the nest is composed on the outside of dead leaves of the reed and sedge, intermixed with a few pieces of grass, and lined with the top of the reed. He describes it as generally placed in a tuft of coarse grass or rushes near the ground, on the margin of the dikes, in the fens; and sometimes is fixed among the reeds that are broken down, but never suspended between the stems. Their food, he says, is principally the seed of the reed; and so intent were they on their search for it, that he had taken them with a bird-limed twig attached to a fishing-rod. When alarmed by any sudden noise, or the passing of a hawk, they uttered their shrill musical notes, and concealed themselves among the thick bottoms of the reeds, but they soon resumed their station, climbing the upright stems with the greatest facility.

Mr. Dykes had an opportunity of examining three specimens, and he found their crops completely filled with the Succinea amphibia in a perfect state, the shells unbroken and singularly closely packed together. The crop of one, not larger than a hazel-nut, contained twenty Succineæ, some of them of a good size, and four Pupæ muscorum, with the shells also entire. The stomach was full of small fragments of shell, in a greater or less degree of decomposition. Numerous sharp angular fragments of quartz which had been swallowed had, with the action of the stomach, effected the comminution of the shells.

Two nests obtained by Mr. Yarrell from the parish of Horsey were sustained only an inch or two above the ground by the strength of the stems of the coarse grass on which they were fixed. Each was composed entirely of dried bents, the finer ones forming the lining; others increasing in substance made up the exterior. Mr. Yarrell states the number of eggs at from four to six, rather smaller than those of the great titmouse and less pointed; eight lines and a half long by six lines and a half in breadth; white, and sparingly marked with pale red lines or scratches. ('British Birds.')

Description.—Male.—Black between the bill and the eye, and these black feathers are very long and prolonged on each side on the lateral part of the neck; head and occiput bluish-ash; throat and front of the neck pure white, which blends on the breast and the middle of the belly into a rosy hue; nape, back, rump, feathers of the middle of the tail and sides fine rust-colour; great coverts of the wings deep black, bordered with deep rusty on the external barb, and reddish-white on the internal barb; quills bordered with white; feathers of the under part of the tail deep black; lateral tail-feathers bordered and terminated with grey; tail long, much graduated; bill and iris fine yellow. Length, six inches and two or three lines.

Female.—No black moustaches; throat and front of the neck tarnished white; upper parts of the head and body rusty, shaded with brown; on the middle of the back some longitudinal black spots; under tail-coverts bright rusty.

Young at their leaving the nest, and before their first moult, with nearly the whole of the plumage of very bright reddish; a good deal of black on the external barbs of the quills and tail-feathers; on the middle of the back a very large space of deep black. After the first moult nothing of the deep black of the back remains but some longitudinal spots.

1412.—The Penduline Titmouse

(*Ægithalus pendulinus*). Parus pendulinus; Rémiz or Mésange de Pologne of the French; Bentelmeise of the Germans. This bird is principally confined to the southern and eastern provinces of Europe; Poland, Hungary, the south of France, Italy, &c. It breeds along the Danube. The Penduline Titmouse, both in habits and in the choice of its food, has many points in common with the species above described. Like the bearded tit, the Penduline titmouse haunts the reedy banks of rivers, or the margins of "wide-watered" shores, and its food consists not only of the seeds of the reeds, but of aquatic insects and mollusks. It derives its name from its pensile purse-like or flask-like nest, generally suspended at the end of some willow twig or other flexible branch of an aquatic tree. This skilfully-wrought cradle is woven from the cotton-like wool or down of the willow or poplar, with an opening in the side for the ingress and egress of the artificers and their young, and mostly overhangs the water; sometimes, however, it is interwoven among the reed stems. The eggs are six in number, and of a pure white marked with spots of red.

In the male the colouring is as follows:—Bill black, straight, a little elongated, and pointed; tail short; top of the head and nape pure ash-colour; forehead, space between the eye and the bill, region of the eyes, and feathers of the orifices of the ears deep black; back and scapulars reddish-grey: rump ash-colour; throat white, the other lower parts whitish, with rosy tints; coverts of the wings chestnut, bordered and terminated with whitish-rusty and white; wings and tail blackish, bordered with whitish-rusty; tail-feathers terminated with white; iris yellow. Length, four inches three or four lines. The female is rather smaller, and has the tints less decided.

1413.—The Black Titmouse

(*Parus niger*). Parus leucopterus, Swainson. This species is abundant in the Caffre country, South Africa, and has been received also from Senegal. In general form and size it approaches the Parus major of Europe, but the bill is shorter and more arched above; the feet are smaller, and the claws shorter, broader, and more curved. According to Le Vaillant, the note of the Black Titmouse, or Mésange noire, is the same as that of our Greater Titmouse; and the nest, he says, is made in the hollow trunks of trees, where the bird also roosts. The eggs are from six to eight in number, and of a pure white. The general colour of this species is a deep uniform glossy black with a slight bluish reflexion in certain lights; the lesser and greater wing-coverts and base of the quill-feathers are of a snowy white, in admirable contrast with the black. Total length, nearly six inches.

Family SYLVIADÆ (WARBLERS).

Fig. 1414 is a group of pictorial specimens of British Sylviadæ:—*a*, the Nightingale; *b*, the Black-cap; *c*, the Wren; *d*, the Redbreast; *e*, the Sedge-Warbler; *f*, the Whitethroat.

The family designated Sylviadæ, or Warblers, comprehends a very numerous assemblage of birds, all of small size and delicate structure, many being noted for their powers of song. In all the bill is more or less slender, with the upper mandible notched; not a few are migratory in their habits, and rank among our summer visitants. For the most part they are woodland in their habits, frequenting groves, hedgerows, plantations, and copses, where their mingled voices resound during the months of May and June, making a wild chorus, as morning dawns, grateful to the ear, and combining with the hues of the renewed foliage, the perfume of early flowers, and the tranquillity of the hour, to impress the mind with pleasing sensations, and fix in it a train of associations as delightful as permanent. The groups of the Sylviadæ are spread over all quarters of the globe, and are destined with others to thin the innumerable hosts of insects which teem in the localities they tenant. Such as are migratory arrive in their summer-quarters at the time when their natural food begins to abound, and retire southwards when the supply begins to diminish, upon the first fall of the leaf, and the cooler breeze of an autumnal evening. As different localities are assigned to different tribes of insects, so, though most are woodland, is a diversity of haunts assigned to the various groups of these birds. Some confine themselves to the higher branches of the trees, some frequent dense humid thickets, some hedgerows, some tall reed-beds, some grassy lawns, pasture lands, and wide commons; and in each place do they find the insects most suitable to their appetite. A few feed during the summer months on ripe berries, as well as on insects; and visit gardens and shrubberies.

The Sylviadæ are thrown by naturalists into several minor groups or subfamilies, as Saxicolinæ, Stonechats; Philomelinæ, Nightingales, &c.: but as our object is rather to illustrate the general outline of ornithology than enter into minutiæ, we shall restrict our observations to the pictorial specimens before us, which embody the principal forms of the present family.

1414 (*a*), 1415, 1416.—The Nightingale

(*Philomela Luscinia*). ἀηδὼν of the ancient Greeks, Luscinia and Philomela of the Latins. Rossignuolo, Rusignuolo, and Usignuolo of the modern Italians; Rossignol of the French; Ruiseñor of the Spanish; Nachtigall of the Germans; Nachtergahl of the 'Fauna Suecica;' Nattergale of Brunnich; and Eos of the ancient British. It is the Luscinia of Gesner, Aldrovandus, Willughby, Ray, and Brehm: Motacilla Luscinia of Linnæus; Sylvia Luscinia of Latham and others; Curruca Luscinia of Fleming; Philomela Luscinia of Selby, Gould, and Swainson; and the Luscinia Philomela of Bonaparte.

This deservedly celebrated songster is a summer visitor to our island and the European continent, migrating in winter into Egypt and Syria, and the northern districts of Africa. On the Continent it extends its range as far northwards as Sweden; but in our island, strange to say, its distribution is limited. It is stated to be tolerably common about Doncaster, in Yorkshire; but though this may be the case, it is certainly of rare occurrence in Lancashire, Cheshire, and Derbyshire. It does not visit Cornwall or the western parts of Devonshire, nor (though Dyer, in his 'Grongar Hill,' makes this bird the companion of his Muse in the Vale of Towey) is it heard in Wales, excepting perhaps on the border line of South Wales, and that very rarely. It never visits Ireland; nor is it known in the Channel Islands, Guernsey, Jersey, &c. In the south-eastern counties it is abundant; and especially in Surrey, Sussex, Hampshire, Dorsetshire, Essex, Middlesex, Berkshire, &c. The causes of this partial distribution have not hitherto been satisfactorily explained. On the Continent it is nowhere more abundant than in Portugal, Spain, and Italy, where, however, as in England, it is migratory, leaving those countries on the setting in of winter. The islands of the Greek Archipelago are visited by this bird; it is found also in Judea, and Mr. Strickland observed it at Smyrna on the 5th of April. Mr. Gould states that he has "received specimens from Northern Africa, but never obtained any from the central or southern parts of that portion of the globe; it would appear therefore that its distribution over that vast continent is very limited."

The nightingale haunts close shrubberies, copses, and dense coverts, in low humid situations, and, as it has been observed, more especially where the cowslip grows plentifully. To these favourite spots the males, which precede by about ten days the females, on their visit to our shores, immediately make their way, and begin their rich strains of invitation, striving, as it would seem, to excel each other in the fulness of their notes and the luxuriance of their modulations. This bird, as its name implies, sings at night, and its strains, heard by calm moonlight when all is silent around, are very pleasing; but it is not only at night that this songster pours out his melody; he sings also during the day, but his strain, mingled with the voices of other birds, is less effective, less captivating than when uttered during the moonlit hour, and listened to amidst the shadowy stillness of its embowered retreat.

It is only prior to the work of incubation, and the labours of rearing the young brood, that the notes of the nightingale are poured forth in their fullest melody; and at the latter end of the season, before leaving our shores, the voice of song is exchanged for a hoarse kind of croak.

The nightingale breeds in the thickest coverts, and so artfully constructed and so well concealed is the nest, that it is not to be discovered without great difficulty. It is generally placed low in a thick bush, or on the ground amongst intertangled stems. The outside is composed of withered leaves, or grass, or of the skeleton leaves which accumulate under hedges and thickets; internally it is lined with fine fibres of roots and hair. The eggs are five in number, and of an olive brown. The young are fed with soft caterpillars, which, with insects and berries, constitute the diet of the adults.

The nightingale measures about seven inches in length: its general plumage above is of a rich brown, the lower part of the back and tail having a reddish tinge; the under parts are ash-colour. Closely allied to the nightingale are three species peculiar to the Continent: the Curruca Philomela (Philomela Turdoides, Blyth), C. Sericea, and C. Orphea. (See Gould, and Temminck's 'Manuel d'Ornithologie.') The song of the first is loud, but far inferior to that of the nightingale.

1414 (*b*), 1417, 1418.—THE BLACK-CAP

(*Curruca atricapilla*). This species, scarcely inferior to the nightingale in its musical powers, arrives in our island about the middle of April and leaves at the end of September. It is the Fauvette à tête noire of the French, der Mönch of the Germans, the Capinera gentile, or, from its fondness for ivy-berries, Capinera d'edera of the Italians, who class it under the birds called Beccafico so prized for the table. The black-cap is very shy and retired, concealing itself amidst the foliage of trees, while it pours forth at intervals its varied flute-like tones, which, like the nightingale, it continues when eventide is ended. Not only has it its own peculiar strain, but it has also the power of imitating the voices of various other birds, and so admirably as to deceive the listener.

"When the black-cap," says Mr. Sweet, "first arrives in this country, its chief food is the early ripened berries of the ivy, and where those are, there the black-caps are first to be heard singing their melodious and varied song. By the time the ivy berries are over, the little green larvæ of the small moths will be getting plentiful, rolled up in the young shoots and leaves; then is this their chief food until the strawberries and cherries become ripe: after that there is no want of fruit or berries till their return, and there is no sort of fruit or berry that is eatable or wholesome that they will refuse. After they have cleared the elder berries in autumn, they immediately leave us."

Woods, thickets, and orchards are the favourite haunts of this species, and there, among dense bushes and brambles, it builds its nest, which is composed of dried stalks of goose-grass, a little moss or wool, and lined with fibrous roots and a few hairs. The eggs are five in number, of a reddish brown, with spots of a darker tint, intermixed with others of an ashy grey. Fig. 1419 represents the egg of the present bird. The male black-cap measures nearly six inches in length; crown and occiput black; neck and breast grey. Upper parts grey tinged with oil green; under parts ashy grey. In the female, which exceeds the male in size, the crown of the head is umber brown, and the general tints of the plumage are darker and more decidedly washed with green.

The black-cap is widely dispersed as a summer visitant through the northern parts of Europe, extending as high as Lapland. Temminck says that it is rare beyond the Apennines and Pyrenees. In Madeira it is a common and a permanent resident, as it is also in the environs of Rome and southern Italy. The Sylvia melanocephala, Latham, a native of the South of Spain, and the S. sarda of Marmora, are allied but distinct species.

1420.—THE GREATER PETTICHAPS, OR GARDEN WARBLER

(*Curruca hortensis*). This bird is the Beccafico, or Fig-eater of the Italians, the Becfigue of the French, Ficedula of the Latins, Συκαλλις of the Greeks; but this name Fig-eater, as is well observed by Prince C. L. Bonaparte, in his 'Specchio Comparativo,' is applied to different kinds of Sylvan Warblers, whenever they are fat and in a good state for the table. These are generally fruit-eaters in the season. The true Beccafico, however, with its "carne squisita," is, according to the Prince, this species, the Sylvia (Curruca) hortensis.

This bird, which in many districts is far from being rare, was first described as a British species by Latham: it arrives in April and departs early in September; and, according to Selby, extends its range not only throughout most parts of England, but the greater part of Scotland, particularly where lakes and rivers are bordered by wooded extent of country. It is abundant over the south of Europe. The Greater Pettichaps is little inferior to the nightingale in song, and sometimes utters its varied notes after sunset. Some of the notes are peculiarly mellow, and closely approach those of the blackbird, while others are quick, shrill, and lively. During the performance of its strain the bird is seldom seen, for, like the rest of its tribe, it is shy and recluse, lurking in the shadiest coverts, amidst the foliage of some close thicket; but sometimes may be observed warbling from the upper light branches of a tree. Lewin says that it makes its nest for the most part with fibres and wool, sometimes with the addition of green moss, often in the neighbourhood of gardens which it frequents, with the white-throat and black-cap, for the sake of currants and other fruits. Montagu, who has recorded this habit, which we can personally verify, states also that it inhabits thick hedges, where it makes a nest near the ground, composed of goose-grass (Galium Aparine, Linn.) and other fibrous plants, flimsily put together, like that of the common white-throat, with the addition sometimes of a little green moss externally. Selby gives much the same description. It lays four, sometimes five eggs, about the size of a hedge-sparrow's or hedge-warbler's, of a dirty white blotched with light brown (Selby says wood brown), the blotches being most numerous at the larger end. Its alarm call, according to Selby, is very similar to that of the white-throat; and C. Bonaparte notes it as common near Rome in the autumn.

Total length, about six inches.

The whole of the upper parts oil-green, with a shade of ash grey. On each side of the lower part of the neck is a patch of ash grey. Breast and flanks yellowish grey, inclining to wood brown. Throat and under parts greyish white. Orbits of the eyes white; irides brown; bill wood-brown. Legs and claws bluish grey.

The female is similar in plumage to the male bird.

1414 (*f*).—THE WHITE-THROAT

(*Curruca cinerea*). Fauvette grise, or Grisette, of the French; Fahle Grasmücke of Bechstein.

This, like the two former species, is a migratory bird, visiting our island and the middle and northern districts of the European continent during the summer. It frequents tall hedgerows and copses, and possesses a pleasing but hurried and feeble song, which it frequently utters upon the wing, as it suddenly rises from the spray upon which it had been perched, to a considerable height in the air, and then slowly descends to the same spot whence it had taken its departure. In executing this movement its flight is peculiarly quivering, and cannot have been unobserved by those who are accustomed to observe the habits of birds in a state of nature.

Besides insects and their larvæ, the white-throat feeds on currants and other garden fruit which ripens during the summer.

The nest of this species is built among brushwood, nettles, or brambles, and is composed of the withered stems of goose-grass intermixed with hair. The eggs are five in number, of a greyish white speckled with wood brown and grey.

The white-throat is about five inches and a half in length; the general colour above is brown, the top of the head being tinged with soot black. The quill-feathers and coverts are blackish brown margined with light reddish brown; the flanks and chest are ash grey tinged with red; the throat and middle of the abdomen are white. An allied but smaller and darker coloured species, the Lesser White-throat (Curruca garrula), is not uncommon in some districts (we have seen it round London, and have specimens killed in the fields about Hammersmith), but from its extremely recluse habits, tenanting the thickest hedges, it escapes ordinary observation.

1421.—THE WHINCHAT

(*Saxicola Rubetra*). Grand Traquet, Traquet Groulard, Tarier, Thyon Semel (in Lorraine), of the French; Grosser Fliegenfänger, Gestettenschläger, and Braunkehliger Steinschmätzer of the Germans; Salta-bastone con la gola bianca and Stiaccino of the Italians; Furze-chat, provincial English; and Clochder yr eithin of the antient British. This bird is dispersed during summer throughout Europe, from the Mediterranean to Norway, Sweden, and temperate Russia; it passes the winter in Northern Africa, and has been observed during that season in Smyrna. It arrives in our island in April, and departs at the latter end of autumn. Commons, wide open fields, and heaths are its favourite places of residence. In some counties it is very abundant, and its well-known cry, *u-tick*, *u-tick*, may be heard as the bird flits from bush to bush, perching on the topmost twigs. It utters this cry with a singular jerk of the tail, repeating the last syllable two or three times in succession, and immediately flits off to the next bush, repeating its cry as before. Small shelled snails, slugs, and coleopterous insects constitute its food, and we have seen it take insects on the wing, darting at them from its perch, and passing onwards after seizing them. The nest is usually placed under the shelter of furze or brushwood on the ground, and is formed of dry stalks of grass lined with finer bents and fibres; the eggs are five in number, of a bluish green with a few small reddish brown specks. The song of this active sprightly bird is a trifling but not unpleasant warble, and is sometimes uttered late in the evening. Mr. Sweet states that when caught young it may be taught any tune, and will learn the song of any bird it hears.

The whole of the upper surface of the male whinchat is of a yellowish brown, each feather having a central dash of brownish black; a large spot of white occupies the centre of each wing. A broad stripe of white passes above the eyes, while the cheeks and ear-coverts are black. The throat, the sides of the neck and the basal half of all the tail-feathers, except the two middle, are also white, the rest of the tail being black; the chest is fine light rufous. The female, our upper figure, wants the black on the cheeks and the white on the wing, and the general colours of the plumage are much less distinct and pure.

1422.—THE WHEAT-EAR

(*Saxicola Œnanthe*). Moteux, Vitrec, and Cul blanc of the French; Codo bianco, Fornaiola, Petragnola, Culbianco, and Codetta d'estate of the Italians; Steinschwätzer, Steinschmappel, Grauruckiger, Steinschmätzer, and Weissschwanz of the Germans; Tapuit of the Netherlanders; Stenguetta of the Swedes; Steendolf, Steensguette, and Steengylpe of the Norwegians; Fallow-finch, Fallow-chat, White-tail, Stone-chacker, &c., provincial English; Tinwen y cerrig of the antient British.

The wheat-ear is a bird of passage widely spread during the spring and summer over the whole of Europe, from the shores of the Mediterranean to Lapland, Sweden, Norway, and Iceland. Everywhere it resorts to wide open downs, sheep-pastures, and commons, scattering in pairs over the country, for the purpose of breeding, and collecting in vast flocks during the autumn, which gradually migrate southwards. In our island it makes its appearance early in March, and the numerous specimens which we have seen killed during that month around London had their stomachs filled with the fragments of coleopterous insects, and were so loaded with fat that in many instances the plumage was spoiled by its oozing from the perforations made by the shot.

The wheat-ear trips along over the grass with great dexterity, and its flight, which is low, is smooth and rapid; the male has a soft sweet warble, which is often uttered while on the wing. According to Mr. Sweet, the wheat-ear confined in an aviary sings by night as well as by day, and in winter as well as through the summer months, the notes being at that season the most varied.

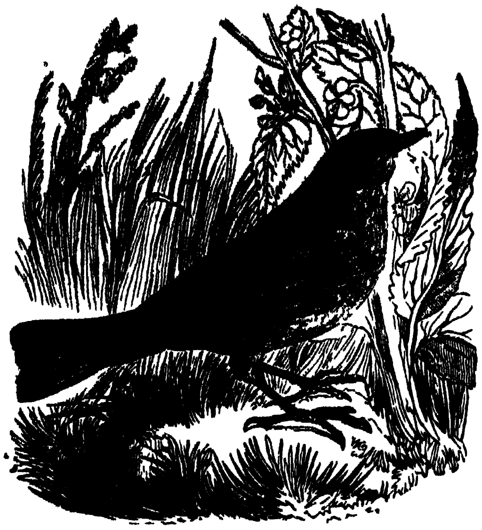
The nest of this species is composed of dried roots, grasses, feathers, and fur, and is concealed with great care so as not to be easily detected; it is sometimes placed under the shelter of a turf or stone, among the fissures of old walls or stone-quarries, in the deep crevices of rocks, or in deserted rabbit-burrows. The eggs, five or six in number, are of a pure bluish green. On visiting the downs and open lands of Kent and Sussex in the months of August and September, we cannot fail to observe the vast numbers of these birds which are drawn thither and collected from all the more northern districts of our island, previously to their departure; day after day brings a fresh influx. At this season multitudes are caught for the table, their flesh being esteemed a great delicacy.

In the male the top of the head and the upper part of the back are of a fine grey; a white line passes from the beak above the eye, succeeded by a black band which surrounds the eye and spreads over the ear-coverts. The lower part of the back and basal half of the tail-feathers (the two middle excepted) are white, the rest black. The wings are black; the chest is of a delicate fawn colour fading into white. The female wants the white superciliary stripe, and the black band is exchanged for one of a dull brown; the general plumage is less pure and bright, the wings are brownish, and the chest reddish passing into white below. The lower figure represents the male.

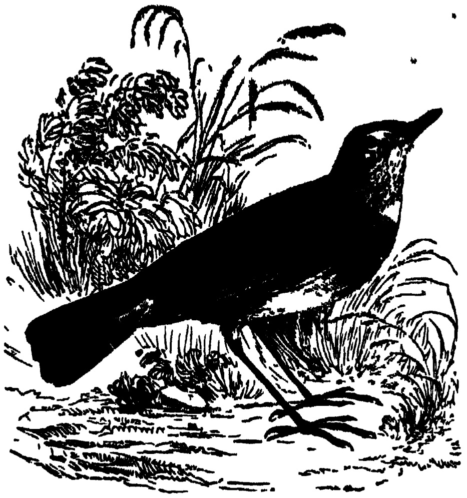
1423.—THE MOUNTAIN SHORT-WING

(*Brachypteryx montana*). This bird, the Kelek of the Javanese, the Mountaineer Warbler of Latham, is in many points allied to the Saxicolæ. It is a native of Java.

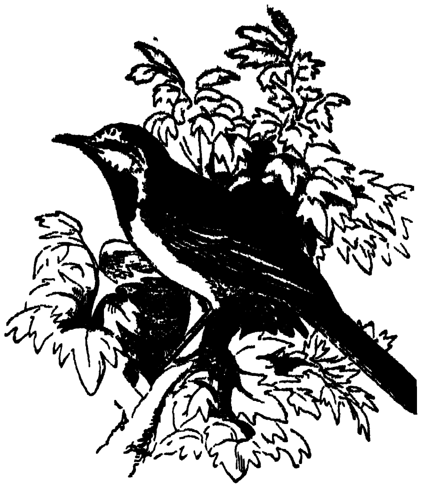
Dr. Horsfield met with this species in one situation only, viz., Mount Prahu, at an elevation of



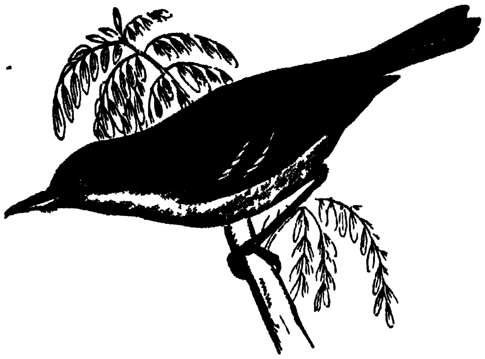
1424 —Blue Bird



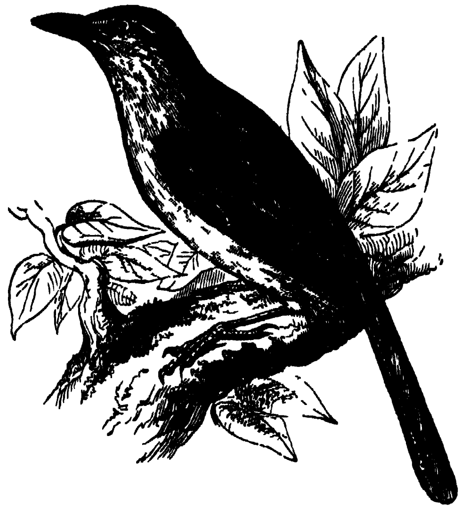
1425 —Blue-throated Redstart.



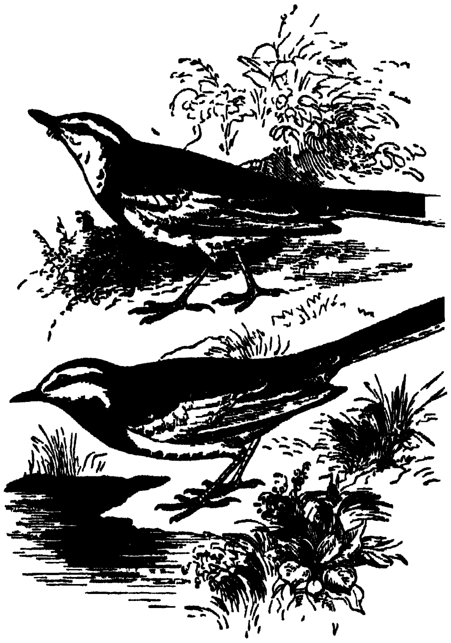
430.—White Wagtail of the Continent.



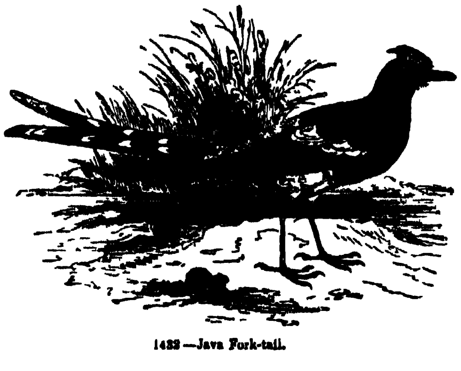
1426.—Grey-Backed Warbler



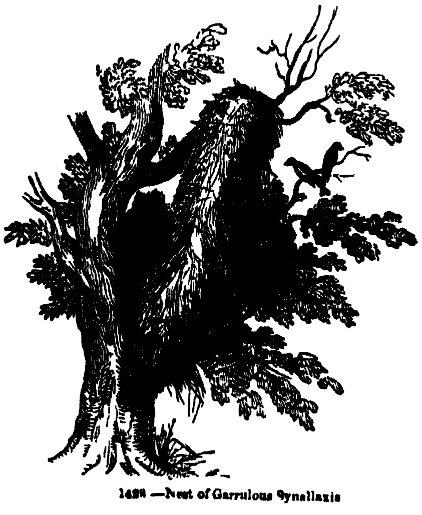
1427.—Garrulous Synallaxis.



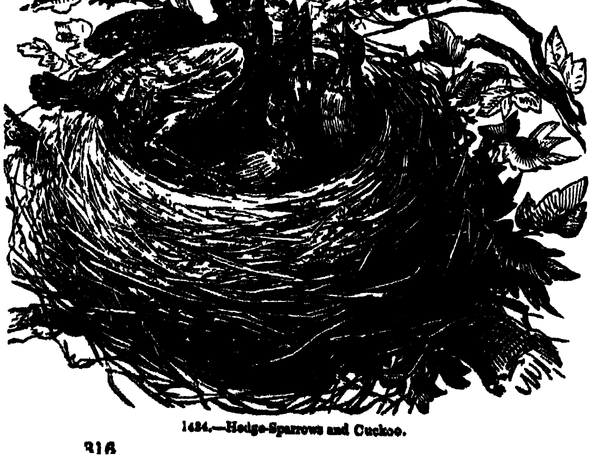
1431 —White winged Wagtails



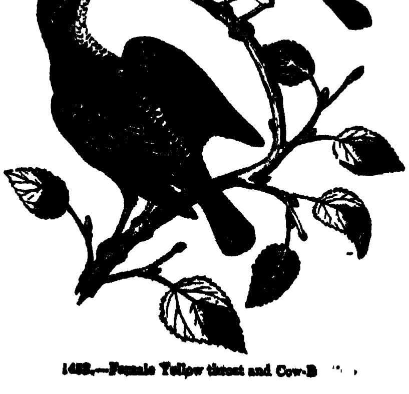
1432 —Java Fork-tail.



1428 —Nest of Garrulous Synallaxis



1434.—Hedge-Sparrows and Cuckoo.



1433.—Female Yellow throat and Cow-B

1441.—Nest of Sedge Warbler

1436.—Kentucky Warbler

—Nest of Pino pino

1440.—Nest of Yellow-Wren.

1438.—Nest of Pino-pino.

1435.—Familiar Creeper.

1442.—Nest of Sedge Warbler

1443.—Nest attributed to Reed Bunting.

1444.—Nest of Tailor Bird.

1437.—Nest of Capocier

about seven thousand feet above the level of the sea, but thinks it probable that it may be found on all the peaks of Java, which are covered with thick forests accommodated to its peculiar habits. The recurrence, he observes, of several quadrupeds and birds, at a certain elevation, is as regular in that island as that of many plants and insects. On Mount Prahu, which, he says, in the luxuriance of its vegetation and gloomy thickets is probably not surpassed in any portion of the globe, this bird is very numerous. In his daily excursions Dr. Horsfield uniformly observed and occasionally surprised it in its short sallies among the openings of the forest. It was chiefly found on the lowest branches of trees or on the ground. As the shortness of its wings incapacitates it for elevated or distant flights, its motions are low, short, and made with great exertion. It lives in the thickest coverts, feeding on the larvæ of insects, worms, &c., and there it forms its nest on the ground. "It utters, almost without interruption, a varied song. Its common note is a quickly reiterated babbling, resembling that of the Curruca garrula of Brisson, and other birds of this family: it also has a protracted plaintive note, but it sometimes rises to higher and melodious warblings, which, in the general silence of these elevated regions, afford an inexpressible sensation of delight to the mind of the solitary traveller."

In the male the head and neck are of a dark indigo blue, variegated with darker and lighter shades; above the eyes a white mark; body generally ferruginous; wings and tail black; lower part of breast and abdomen whitish; plumage lax and silky. Length, nearly ten inches.

In the female the dark blue tint, which in the male covers the head and neck, extends over the body generally, and also marks the exterior vanes of the quills. The throat and neck underneath have a dark greyish tint. The abdomen is greyish white. The covering of the abdomen and thighs is long, delicate, silky, and pendulous. The lower figure represents the male.

1414 (*d*).—The Redbreast

(***Erythaca Rubecula***). Rouge-gorge of the French; Rothburstiger Sanger of Meyer. This familiar and beautiful little bird is a permanent resident in our island, but in Norway and other northern districts of continental Europe it is migratory, passing southwards on the approach of winter. Everywhere this species is a favourite, and has in most countries received appellations indicative of attachment: thus in Sweden it is called Tomi Liden; in Norway, Peter Ronsmad; in Germany, Thomas Gierdet; and in England, Robin Redbreast. In the spring the redbreast leaves the immediate vicinity of our habitations, for the wood, copse, or shady garden, where, in conjunction with his mate, he builds a nest, shrouding it amidst dense foliage, on a bank, among the roots of trees, or in the crevice of an old ivy-shadowed wall or crok. The eggs are of a pale yellowish grey, with numerous reddish-brown spots.

When the chillness of autumn proclaims the approach of winter, the redbreast leaves the woods and thickets, and, seeking for food and shelter around the precints of our dwellings, "pays to trusted man its annual visit;" and utters its clear notes while perched upon the twig of a leafless tree. The song of the redbreast near the window is the presage of the autumn.

This species is bold and spirited, and will not admit the approach of any small bird near its nest, nor the presence of a rival within the precincts it has selected for its walk through the winter; two males, indeed, seldom meet at any time without a conflict. We will not enter into the descriptive details of a bird with which all are acquainted.

1423*, 1424.—The Blue-Bird

(***Erithica sialis***). Sialis Wilsoni, Swainson. Like our redbreast, this harbinger of spring to the Americans "is known to almost every child, and shows," says Wilson, "as much confidence in man by associating with him in summer, as the other by his familiarity in winter."

"So early as the middle of February, if the weather be open, he usually makes his appearance about his old haunts, the barn, orchard, and fence-posts. Storms and deep snows sometimes succeeding, he disappears for a time; but about the middle of March is again seen accompanied by his mate, visiting the box in the garden, or the hole in the old apple-tree, the cradle of some generations of his ancestors."

It is interesting, says a curious and correct observer, "to behold his courtship, his solicitude to please and to secure the favour of his beloved female. He uses the tenderest expressions, sits close by her, caresses and sings to her his most endearing warblings. When seated together, if he espies an insect delicious to her taste, he takes it up, flies with it to her, spreads his wing over her, and puts it in her mouth."

The food of the blue-bird consists principally of insects, particularly large beetles and other coleoptera, frequently of spiders, and sometimes of fruits and seeds.

The nest is built in holes in trees and similar situations. The eggs, which are of a pale blue colour, are five in number; two and sometimes three broods are produced in a season.

Its song is cheerful, continuing with little interruption from March to October, but is most frequently heard in the serene days of the spring.

With regard to its geographical distribution, Catesby says, "These birds are common in most parts of North America, for I have seen them in Carolina, Virginia, Maryland, and the Bermuda Islands." Wilson gives the United States, the Bahamas, Mexico, Brazil, and Guiana, as its localities. About November it takes its departure from the United States. The whole upper part of the bird, which is about seven inches and a half long, is of a rich sky-blue shot with purple. The bill and legs are black. Shafts of the wing and tail-feathers black. Throat, neck, breast, and sides, partially under the wings, reddish chestnut. Wings dusky black at the tips. Under parts white. The female is duller in its colours.

1425.—The Blue-throated Redstart

(*Phœnicura Suecica*). Gorge-bleue of the French; Blankehlein of the Germans; Petto Turchino of the Italians.

This beautiful bird is only an accidental visitor to our island, and is even rare in France and Holland. According to Bonaparte, it appears about the neighbourhood of Rome only in severe weather. Bechstein assures us that it is far from being uncommon in Germany, and that if in the first fortnight of April, up to the 20th, cold and snow return, plenty may be found by merely following the streams, rivers, and ponds, especially in the neighbourhood of a wood. The nest is said to be built in bushes and in the holes of trees. General colour above ashy-brown; a reddish white line passes above the eyes; cheeks dark brown spotted with rust red; throat and upper part of chest of a rich azure blue, bounded by a narrow gorget of black, succeeded by another of reddish brown or orange, a central spot of the purest white on the larynx contrasting with the surrounding azure. Under parts dusky white. Tarsi one inch in length. Total length of bird, five inches and a half.

1426.—The Grey-backed Warbler

(*Sylvicola plumbea*). The various species of this genus feed on insects, which they often take in the manner of the flycatchers; they are lively and active, continually hunting after sedentary insects, and pursuing such as fly from bough to bough: all are American. The grey-backed warbler is of a fine blue grey above, golden yellow beneath; back olive; wing-coverts tipped with white. Native country, Brazil.

1414 (*e*).—The Sedge-Warbler

(*Salicaria Phragmitis*, Selby). This species, which is one of our summer visitors, resorts to marshes, and the banks of lakes or rivers, wherever extensive reed or osier beds afford it shelter. In such situations it may be heard, while concealed from view, uttering its varied song, which is continued through the greater part of the night. Amongst its notes may be distinguished imitations of those of the swallow, lark, sparrow, and linnet, mingled with guttural intonations, the whole delivered confusedly and with great rapidity. Several may be often heard in chorus.

This species generally attaches its nest to the stems of three or four reeds growing close together, or to twigs of osiers. It is composed of grasses and a little moss, with a lining of hair and fine dried grass. The eggs are of a pale brown with darker spots. This species is abundant on the Continent; it is allied to the Reed Wren (Salicaria arundinacea, Selby), but is smaller, and is distinguished by a yellowish-white streak above the eye. The general colour above is brown or yellowish brown; the feathers of the head and upper part of the back being washed in the centre with dusky black. Under parts generally pale yellowish white.

1427.—The Garrulous Synallaxis

(***Synallaxis garrulus***). **Mr. Swainson has given a good figure of this bird under the name of Malurus garrulus, in the first series of his Zoological Illustrations. It is remarkable, he observes, for its very singular nest, which is so large as to form a feature in the woodland scenery of Bahia, the only part of Brazil where he observed it. He describes the nest as built in low trees, formed externally of dried sticks, without any neatness, usually three or four feet long, and resembling at a distance a thick twist of bean-stalks thrown in the branches by accident. Sometimes, he says, two of these nests appear as if joined together, and there is an opening on the side, besides one at the top. He farther states that the sexes are generally seen near the nest, uttering a shrill, incessant, monotonous chirp, particularly in the morning and evening; adding that he never could bring himself to tear one of these nests to pieces merely for the purpose of seeing its construction. Fig. 1428 represents the nest.**

General colour of this species brown, beneath whitish, feathers on the front of the head rigid, pointed, and rufous; lines before and behind the eye whitish; tail moderate, rounded.

1429.—The Pied Wagtail

(*M. Yarrellii*, Gould). Motacilla alba of authors. The birds composing the genus Motacilla, and subgenus Budytes, are confined to the Old World only. They are an active and graceful race, tripping along smooth grass-plots and commons, around the edges of ponds or rivulets, and sandy river-shores, in search of their insect food, their long tail incessantly vibrating, and particularly after each short flight made in pursuit of some passing insect, for they take their prey both on the wing and on the ground. They are subject to a double moult, in autumn and in spring, the latter of which changes the colour of the neck, and in some species of the head also.

Mr. Gould was, we believe, the first to discover that the Pied Wagtail of England is a distinct species from the Pied or White Wagtail so common in France and other parts of the Continent, and which is perhaps the true M. alba of Linnæus; certainly of the modern Continental ornithologists. Mr. Gould states, besides the British Islands, Norway and Sweden are the only parts of Europe where he has been able to procure specimens identical with our British bird, whence he concludes that its range is very limited. He then goes on to observe that the Pied Wagtail of England is somewhat more robust in form than the Continental bird, and when in full summer dress has the whole of the head, chest, and back of a deep black; while in the White Wagtail of France, at the same season, the throat and head alone are of this colour, the upper surface being light ash-grey. In winter the two species more nearly assimilate in their colouring, and this circumstance is more probably the cause of their having hitherto been considered identical; the black back of M. Yarrellii being grey at this season, although never so light as in M. alba.

The British Pied Wagtail is incessantly in motion, running about in quest of prey, and ever and anon moving from place to place by short undulating flights, uttering a lively note, and, on gracefully alighting, rapidly vibrating its tail, which seems as if hung on tremulous springs It frequents grass-plots, commons, and the borders of sheets of water, and will wade in search of aquatic insects; nor are even small fishes safe from its attacks. W. Rayner, Esq., in a letter to Mr. Yarrell, quoted in his 'History of British Birds,' states that in the summer and autumn of 1837 he had in his aviary several wagtails, the pied and yellow, "both of which were very expert in catching and feeding on minnows which were in a fountain in the centre of the aviary. These birds hover over the water, and catch the minnow as it approaches the top, in the most dexterous manner. I was also much surprised at the wariness and cunning of some blackbirds and thrushes in watching the wagtails catch the minnows, and immediately seizing the prize for their own dinner." The nest of the British Pied Wagtail is composed of fibres of roots, withered grass, and moss, lined with hair and a few feathers: it is generally placed near water, on a bank, or in the hole of a wall, or crevice between stones, among logs of woods, or in the thatch of an outbuilding or cart-shed. The eggs are white spotted with ash-colour. This species may be often seen running about close to cows reposing in their pasture-land, busily engaged in collecting the flies that settle on the sides or limbs of the placid ruminants, or flit about them.

1430.—The White Wagtail of the Continent

(***Motacilla alba***). **La Bergeronette grise and Lavandière of the French; Cotremolo, Codetta, Codetta di Pecore, Ballarina, Monachina, and Cuttretola of the Italians; Die Weisse Bachstelze and Weisse und Schwartze Bachstelze of the Germans. This species is common throughout the continent of Europe, and inhabits the highlands of India, extending also into Africa: its habits are similar to those of our British Pied Wagtail.**

1431.—The White-winged Wagtail

(***Motacilla lugubris***). **This species is a native of eastern Europe, seldom advancing farther west than** the central parts. It is found in southern Siberia, Hungary, Egypt, the Crimea, and Asia Minor: it is very common in Japan, frequenting the streams of valleys among the mountains. The upper figure represents the bird in its winter dress; the lower, in its summer plumage.

1432.—The Java Forktail

(*Motacilla speciosa*, Horsf.); Enicurus speciosus, Temm.; Chengingíng or Kingking of the Javanese. In habits and manners this bird resembles the Pied Wagtail, and is found in Java near small rivulets, more especially such as have a rocky or gravelly bed; it is there seen running about with alacrity, incessantly moving its tail and picking up worms and insects. It is almost entirely confined to the southern coast of Java, which abounds in streamlets descending rapidly from the southern hills and shaded by luxuriant shrubs. (Horsfield's 'Zoological Researches.')

1433.—The Female Maryland Yellow-throat

(*Sylvia Marylandica*, Wilson) feeding the young of the Cow-Bunting (Molothrus Pecoris). The Maryland Yellow-throat is a pretty little warbler, inhabiting the deep humid thickets of the United States of America, where it prys about the stems, leaves, and roots in quest of insects, peeping into every crevice, and occasionally uttering a simple twitter. Its nest is placed on the ground among dried leaves, in the depth of a thicket of briars, arched over, and a small hole left for entrance. It is in the nest of this species and in those of three or four others that the Cow-Bunting drops her eggs, one in each nest; this is hatched by the foster parent, who rears the young one, which, as it would seem, is excluded from the egg before the young of the Yellow-throat, and as the intruder demands care and food, the other eggs are neglected and the chicks which they contain necessarily perish. As the young Cow-Bunting grows up, its foster parents provide for it with great assiduity, and manifest all the anxiety respecting it which they would do were their own offspring under their charge. In this strange proceeding we are reminded of the cuckoo, which lays an egg in the nest of the hedge-sparrow or titlark; but in the latter case the young cuckoo is not excluded from the egg before the rest, but, exceeding them in size and strength, is enabled in a short time to jostle them all out of the nest, that he may have room enough for himself, and receive undivided attention. Fig. 1434 represents the nest of the hedge-sparrow (Accentor modularis), with a young cuckoo clamorous for the food which the foster-parent is bringing, and of which its own young are to be deprived. That Shakspere was well acquainted with the habits of the cuckoo and the nursing of its young by a foster-parent, "which," as Mr. Selby says, "has within these late years been fully substantiated," is very evident from the words he puts in Worcester's mouth:—

> "And being fed by us you used us so
> As that ungentle gull, the cuckoo's bird,
> Useth the sparrow, did oppress our nest,
> Grew by our feeding to so great a bulk,
> That even our love durst not come near your sight."
> *King Henry IV*, Part I, Act v, Scene 1

1435.—The Familiar Creeper

(*Prinia familiaris*). Prinya of the Javanese. Mr. Swainson, in his 'Classification of Birds,' thinks that Prinia may be a subgenus of Drymoica, a group of the Sylviadæ. The Priniæ, he observes, have all the activity and familiarity of the wrens, so much resemble them in general appearance, in their short sweet song, and the habit of throwing up the tail, that it is not very surprising they should be classed with the scansorial creepers. The present species is a native of Java, frequenting gardens, among the shrubs and trees of which it builds its nest. It is sprightly, and sports in short and rapid flights amidst the branches.

General colour above, dark brown, with a tinge of orange; throat white; breast sulphur yellow; wings crossed by two white bands; tail-feathers, except the two middle, marked near the end with blackish-brown; tarsi yellowish.

1436.—The Kentucky Warbler

(*Sylvia formosa*, Wilson). This beautiful bird is particularly numerous in Kentucky and Tennessee, frequenting low damp woods, and building its nest sometimes in the fork of a low bush and sometimes on the ground. The materials are loose grass mixed with the light pith of weeds, and lined with hair. The eggs are white, sprinkled with reddish. Its notes are loud and monotonous. The Kentucky Warbler is active and sprightly, but at the same time restless and quarrelsome, fighting with its own species or with others, at least during the breeding season. It migrates southward on the approach of winter.

Length, five inches and a half. Upper parts olive-green; line over the eyes and all the under parts brilliant yellow; head slightly crested; crown deep black, back of head mottled; a large spot below the eye black; legs flesh-colour.

Among our pictorial specimens we have several interesting nests belonging to different species of the Sylviadæ, and illustrative of their varied modes of building.

1437.—The Nest of the Capocier

(*Sylvia macroura*, Latham). The Capocier is a South African bird, which builds, in the fork of a tree, a large felted nest of flax, cotton, and moss, having an oval chamber within and a lateral orifice. Externally it is very irregular, but the walls of the interior are neatly worked, the texture being as fine as woven cloth. A pair of these birds, which Le Vaillant watched while building this structure, were seven days in completing it: it was about nine inches in height externally, and as white as snow, and enveloped the contiguous branches, which, as it were, pierced the sides without deranging the circular cavity of the interior: the quantity of material used was astonishing. It is perhaps to this species that Thunberg alludes when he says that a bird called the Kapoch forms its nest, which is as curious as beautiful, and is of the thickness of a coarse worsted stocking, from the down of the rosemary-tree.

1438, 1439.—Nests of the Pinc-pinc

(*Cisticola textrix*, Swainson). Fig. 1438 is from Le Vaillant; Fig. 1439, from Sonnerat, whose figure is too formal, but it can scarcely be doubted that it is meant to represent the nest of the same species as that given by Le Vaillant.

In many points the nest of the Pinc-pinc resembles that of the Capocier; it is usually placed, says the latter writer, "among prickly shrubs, particularly the mimosas, but sometimes on the extreme branches of trees. It is commonly very large, though some are larger than others, but the difference is only in the external appearance; in the interior they are almost of the same dimensions, namely, between three and four inches in diameter, while the circumference of the exterior is often more than a foot. As the nest is wholly composed of the down of plants, it is either of a snowy whiteness or of a brownish colour, according to the quality of the down which is produced by the neighbouring shrubs. On the outside it appears to be constructed in an irregular and clumsy manner, according to the situation of the branches in which it is built, and to which it is so firmly attached, part of them passing through its texture, that it is impossible to remove it without leaving one-half behind. If, however, the nest have the appearance, on the outside of being badly made, we shall be the more surprised on looking into the interior that so small a bird, without other instrument than its bill, its wings, and tail, could have felted vegetable down in such a manner as to render it as united and of as fine a texture as cloth, even of good quality. The nest in question is of a rounded form, with a narrow neck made on its upper part, through which the bird glides into the interior. At the base of this tubular neck there is a niche, or shelf like appendage, like a small nest resting against the large one, and which, as was observed by Le Vaillant, serves as a momentary resting place, by means of which the Pinc-pinc may pass more easily into the nest, which, without such a contrivance, it might find some difficulty in accomplishing, as it could not move through so small an entrance on the wing; and the outside of the nest being slightly formed, the bird would injure it were it constantly to rest on it, whilst this little appendage is as firmly felted as the interior of the nest. Sometimes there are two or three of these perches."

The Pinc-pinc is familiar in its manners, and in districts where it is not molested will pass in and out of its nest, though a person be closely watching it.

1440.—The Nest of the Yellow Wren, or Haybird

(*Sylvia Trochilus*). The Yellow Wren (Willow Wren of Bewick) is a delicate little warbler, which visits our island in summer, tenanting copses and groves. It usually selects some dry bank, the side of a ditch, or the tangled roots of a bush as the site of its nest, which is a domed structure, composed of the interwoven stems of dried grasses, a little moss and a few leaves, and loosely lined with feathers. The entrance is in front, under the arched dome. The eggs are six or seven in number, of a white colour, spotted with reddish-brown, especially at the larger end.

1441, 1442.—The Nest of the Sedge Warbler

(*Salicaria Phragmitis*, Selby). We have stated that this bird usually suspends its nest between three or four adjacent reed-stems. Mr. Selby has found it also in willow and low birchen bushes. The specimen, Fig. 1442, was built among the branches of lucerne (Medicago sativa), and was almost composed of hay, a few tufts of willow-down and elm-blossoms, with a few hairs within. It is altogether a very different structure from the nest attributed by Bolton to this species (Fig. 1441), which was bound round with stout woollen yarn: we suspect Bolton to have been mistaken.

1443.—A Nest attributed to the Reed-Bunting

(*Emberiza schœniclus*), from a specimen in the British Museum. There can be but little doubt that this nest is really that of the Reed-Wren (Salicaria arundinacea, Selby), for the nest of the former bird is built in a low bush or tuft of grass, and never suspended between the stems of reeds; whereas the nest of the Reed-Wren, which we have often examined, is very deep, almost entirely concealing the bird while sitting, constructed of long grass, and suspended between a few adjoining reeds. Montagu observes that he has seen this bird sitting on her nest when the wind blew hard, and that every gust forced it almost to the surface of the water. The great Sedge Warbler of Holland and other parts of the Continent (Salicaria turdoides) builds a similar nest. Suspended as the nest of the Reed-Wren is, and swinging in the breeze, its depth is necessary to prevent the eggs or young from being thrown out when the supporting reeds are bowed by the force of the wind. The Reed-Wren is one of our summer warblers, and is closely related to the Sedge Warbler; it is, however, larger, and not so extensively diffused over our island, though it is common on the reed beds of our southern and eastern counties. It is abundant in Holland. We have specimens killed in the neighbourhood of London.

1444.—Nest of the Tailor-Bird

(*Sylvia Sutoria*, Latham). Of the nests of this species we have had the opportunity of minutely examining excellent specimens. Dwelling in India, where tree-snakes are abundant, this little bird makes a leaf, at the extremity of a slender twig, its cradle. If the leaf be large enough, it draws the edges together, so as to form a pouch, the end of which is drawn up so as to assist in supporting the bed within; if the leaf be not sufficiently large, another growing by it, or sometimes a dead one, is sewed to it, in order to form a convenient receptacle. The material it sews with is composed of vegetable fibres twisted into a thread. The nest itself within this leafy case consists of fine down intermixed with fibres and a few feathers. An excellent specimen is in the Museum of the Zoological Society.

1445.—A Nest from Lady Clive's Collection of Drawings.

This nest is attributed to a species of Tailor-Bird, called by Latham Merops minimus (Query, a species of Cinnyris?). Forbes, in his 'Oriental Memoirs,' says the Tailor Bird resembles some of the humming birds at the Brazils in shape and colour. The hen is clothed in brown, but the plumage of the male displays the varied tints of azure, purple, green, and gold, so common in those American beauties. Often, he adds, "have I watched the progress of an industrious pair of Tailor Birds from their first choice of a plant to the completion of a nest and the enlargement of the young."

Latham notices among the drawings of Sir J. Anstruther the figure of a nest composed of several leaves, like those of the hazel, sewed together and united to a living leaf on the tree; the inner nest consisting of dry bents, fibres, and hair. The bird, however, was not identified.

1446.—The Nest of the Golden-crested Wren

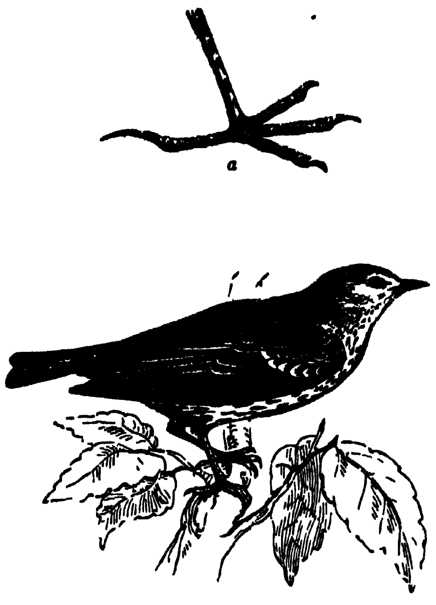
(*Regulus cristatus*). To the nidification of this species we shall hereafter have occasion to refer more fully; we may, however, here observe, that in general it is suspended at the extremity of a sweeping branch of pine or larch attached to the under side of the foliage and secured with great art to the twigs, while a profusion of "tassels" hang over it, securing it from rain and shrouding it from observation. Sometimes it is built amidst embowering ivy covering the trunk of a tree.

1447.—The Nest of the Redbreast

(*Erythaca Rubecula*). We have previously noticed the nidification of this well-known bird:—

> "Humble is his home
> And well concealed, sometimes within the sound
> Of heartsome mill clack, where the spacious door
> White dusted tells him plenty reigns around,
> Close at the root of brier bush that o'erhangs
> The narrow stream
> Oft near some single cottage he prefers
> To rear his little home."
> *Birds of Scotland.*

1448 Meadow Pipits



1449.—Tree Pipit.

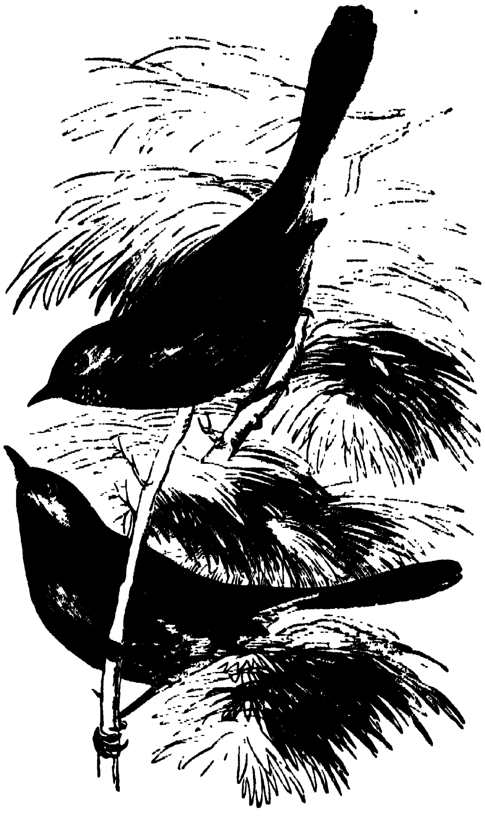
1446 —Nest of Golden Crested Wren

1447.—Nest of Redbreast.

1450.—Group of British Birds.

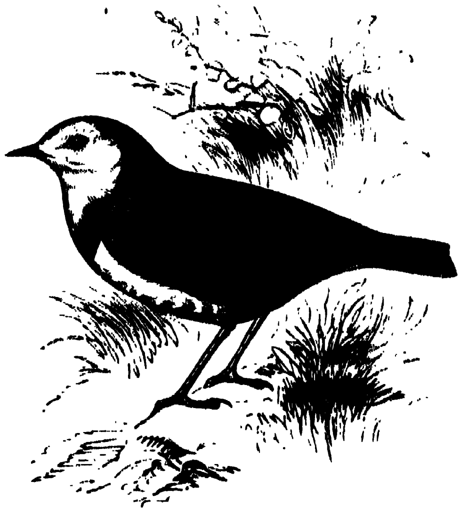
3 —Female Tailor Bird and Nest.

1451.—Stonechats.



1453.—Dartford Warblers.

1454.—Yellow Crowned Warbler.



1455.—White-fronted Ephthianura.

1456.—Nest of Song-Thrush.

1452.—Redstarts.

1460.—a, Fieldfare: b, Redwing.

1448, 1450 (*a*).—The Meadow-Pipit

(*Anthus pratensis*). The pipits, often termed titlarks, form a small yet well-characterised group of Sylviadæ, having the plumage and long hind claws of the true larks, but the slender bills of the wagtails; they have only a remote affinity to the larks which belong to the conirostral tribe; for though, as Mr Swainson observes, they are the analogues of the latter in the dentirostral tribe, we are not prepared to admit that this analogy becomes transmuted into positive relationship.

The meadow-pipit may be regarded as the representative of the skylark (Fig. 1450, *e*, Skylarks and Nest), and like that bird it pours out its song at a great elevation in the air, rising on tremulous wings, and then descending smoothly to the ground, or to the top of some low bush, to its mate, for whose gratification its strains were uttered. Sometimes the meadow-pipit sings on the earth, but generally utters its soft musical notes in the air. This bird is very extensively distributed over Europe, and is common in the British Islands, remaining with us throughout the year. It frequents hilly districts, open commons, meadows, and even marsh lands; and runs over the grassy turf with great celerity; when on a clod or stone, it frequently vibrates the tail, in the manner of the wagtail, and likewise gives chace to insects, on which it feeds, as well as on slugs and worms. In September and October, after the general moult, these birds associate in small flocks, resorting to turnip-fields; and in severe weather to the shelter of hedge-banks and low pastures.

The nest is made on the ground under the covert of a tuft of grass, and is composed of dried bents and fibres, with a lining of finer materials and hairs. The eggs, five or six in number, are of a reddish brown, spotted with darker markings.

The meadow-pipit is about six inches in length. The hind claw (Fig. 1448, *a*) is long and slender. The general colour of the plumage is dark oil-green, with the centre of every feather brownish black; under parts yellow ash white, spotted with dark brown on the sides of the neck and breast, and streaked with the same on the flanks.

1449.—The Tree-Pipit

(*Anthus arboreus*). This species, which may be regarded as the analogue of the woodlark, Alauda arborea (Fig. 1450, *b*), differs from the meadow-pipit in being rather larger; with the beak stouter, the spots on the breast fewer and longer, and the claw of the hind toe much shorter and thicker (see foot, Fig. 1440, *a*). Its habits are also different. It is only a summer visitor to our island, arriving towards the end of April, and taking up its abode in copses, and well-wooded enclosures. The male then commences his song of invitation, which is superior to that of the meadow pipit in compass, variety, and sweetness. This he utters either perched on the top of a tree, or in the air; in the latter case he rises on quivering wings to an elevation about as high again as the tree whence he started; and then, at this altitude, poises his wings, spreads and elevates his tail, and slowly descends, singing all the while, to the station from which he had previously arisen. During his ascent he never sings, but sometimes utters a chirp. Rarely does this species alight upon the ground without previously perching on a tree: and after leaving the ground, it wings its way to a tree before commencing a more lengthened flight. The nest is placed on the ground, and is formed of moss, fibres, and withered grass, lined with bents and hairs. The eggs are generally of a greyish white, clouded and spotted with purple-brown or purple-red, but their colour is variable.

The winter quarters of the tree-pipit are probably the northern and western portions of Africa; it is found in Madeira, and also in Japan, having a wider range of habitat.

1451.—The Stonechat

(*Saxicola rubicola*). Traquet rubicole of the French, Saltabastone, Zomya-cardi, and Saltinpalo of the Italians. Schwarzkehliger Steinschmatzer of the Germans, Clochder y cerrig of the ancient British, Stonechatter, Stonesmith, Moor-titling, &c., provincial English.

Selby states that, unlike the whinchat and the wheatear, the stonechat is stationary in our country throughout the year; but this is not quite correct; for though some few individuals may remain through the winter months, the general body quit the British islands in autumn, and return in spring. Moorlands, wide commons, and open tracts are their favourite haunts; and they flit from stone to stone, or bush to bush, without intermission, giving chace to insects, and continually uttering a clicking note, compared by Buffon to the word "Ouistrata." The male sings a short but agreeable strain, generally while on the wing, hovering over the furze or brambles. The nest, which is of large size, is placed under the covert of a bush or tuft of herbage; and is composed of moss and grass, lined with bents, hairs, and feathers. The eggs are of a pale blue, with a slightly grey tint, and finely dotted at the large end with pale reddish brown.

This species is spread over the whole of temperate Europe, and is found also in India and Africa. The male has the head and throat black; the sides of the neck, the upper part of the wings, and rump white; breast orange-brown; the rest of the under surface white tinged with yellow: the back black, the feathers edged with yellowish brown; wings brownish black, the feathers with paler edges; bill and legs black. In winter the black feathers of the head and throat are edged with yellowish brown, which disappears as the spring advances.

The lower figure is a male, the upper a female.

1452.—The Redstart

(*Phœnicura ruticilla*). This is the Corossolo, Codrisso, and Culorosso of the Italians; Rossignol de murailles of the French; Schwarzkehliger sanger of the Germans; Gekraagde Roodstart of the Netherlanders; Rodstjert of the Swedes; Roedstiert of the Danes; Blodfugl of the Norwegians; Rhonell goch of the ancient British.

This bird, which is generally dispersed over Europe, is one of our summer visitors, arriving in our island about the middle of April, and leaving early in September.

The redstart is sprightly in its movements, and beautiful in its form and colouring, the black, white, grey, and flame colours which ornament its plumage being conjoined with a graceful contour. It darts at passing insects with great address, accompanying every action with a vibrating motion of the tail, which is continued for several seconds on alighting. In its habits it is by no means recluse or shy; it frequents gardens, orchards, and groves, building in a hole of the wall, between the branch of a fruit-tree and the wall, under the cover of luxuriant ivy in a tool shed, or other outbuilding. The nest consists of moss, lined with hairs and feathers; the eggs are greenish blue. The male utters a soft sweet warble, while sitting on some low branch or other perch, his tail vibrating at the same time; and neither this vibration nor his song ceases as he flits off to a more attractive station. In captivity the redstart is said to become very tame.

The colouring of the male is as follows:—Forehead pure white, a small band on the root of the bill; space between that and the eye, the throat, and upper part of the neck, deep black; head and upper part of the back bluish ash; quill-feathers blackish; the breast, sides, rump, and lateral tail-feathers brilliant ruddy or flame-red; two middle tail-feathers brown; abdomen whitish. The female is of a uniform greyish brown, with the exception of the tail, which is dull rufous. Lower figure, a male; upper, a female.

1453.—The Dartford Warbler

(*Melizophilus provincialis*, Leach). Pette-chou de Provence of the French; Magnanini of Cavi; and Provenser sanger of Meyer.

This warbler is found in the countries of Europe bordering the Mediterranean. It is comparatively rare in Germany and Holland. In England it is a permanent resident, but not generally diffused. It is frequent in the neighbourhood of London; and occurs in Berkshire, Cornwall, and Devonshire. It was first noticed as a British bird by Dr. Latham in the year 1773, who procured a pair from Bexley Heath, near Dartford in Kent, whence its trivial English name.

The Dartford Warbler is scarcely larger than a wren in the bulk of its body, but appears superior in size from the great length of its tail. In its habits and manners it is extremely shy and recluse, concealing itself in thick furze-brakes and tangled heath; and well does it know every labyrinth and every hiding-place of each bush or bed of furze on the breezy common where it takes up its abode. Mr. Gould observes that its form closely allies it to the superb warblers (Malurus) of New Holland, while its relationship to the common white-throat is strikingly apparent. With reference to its secluded habits, the same author observes that in the spring it becomes more lively and frequently visible, rising on quivering wing above the tops of the furze, and uttering a hurried babbling song much after the manner of the white-throat; at these times it erects the feathers of the head into a crest, and distends the throat, exhibiting many attitudes and gesticulations.

Its nest, which is concealed in the very heart of a thick furze-bush not far from the ground, consists of grass, fibres, and fine roots; the eggs are greenish white, with brown speckles and greyish spots.

All the upper parts of the plumage are fine deep grey; tail blackish brown, the outer feathers tipped with white; throat, breast, and sides, of the colour of red-wine-lees; abdomen white. Quill-feathers ash-coloured externally, but with the inner barbs black. Length five inches. The tints of the female are duller than those of the male, and the throat is much more spotted. The lower figure a male, the upper a female.

1454.—The Yellow-crowned Warbler, or Myrtle Bird

(*Sylvicola coronata*). This species is one of the migratory warblers of North America, arriving in the middle and northern states of the Union from the south about the end of April, and passing northwards to breed; in August it returns and stays till November, when it moves southwards. At this season myrtle-wax berries (Myrica cerifera) and those of the Virginian juniper, with a few insects, are its chief food. In the southern states considerable numbers congregate, frequenting during the cold season the swamps and sheltered groves of the sea coast. In fine weather, and the early part of October, they are often seen collecting moths and grasshoppers in the meadows, or darting from a perch after insects, in the manner of fly-catchers; they are ever in motion, hovering amidst the cedars and myrtles, and only rest when satisfied with food. Their ordinary note is a feeble chirp, but during the spring the male utters at short intervals in the morning a sweet varied and rather plaintive warble, resembling the autumnal strain of our redbreast. At this season they frequent groves, orchards, and gardens, and feed upon insects and caterpillars, for which they search with unwearied industry. The length of this species is about six inches. The plumage in summer is of a dark slate-colour streaked with black, beneath white; breast spotted with black; the top of the head, the sides, and the rump yellow; wings with two white bars; tail black, the three lateral tail-feathers spotted with white. In winter the feathers are edged with brownish olive, and the yellow on the crown is partly concealed by a margin of this tint.

1455.—The White-fronted Ephthianura

(*Ephthianura albifrons*, Gould). This is an example of the Australian warblers: it is found at Swan River and in New South Wales, as well as on the small islands in Bass's Straits, where it was observed by Mr. Gould, who informs us that it is very sprightly and active, particularly, he adds, "the male, whose white throat and banded chest render him much more conspicuous than the sombre-coloured female. As the structure of its toes and lengthened tertiaries would lead us to expect, its natural province is the ground, to which it habitually resorts, and decidedly evinces a preference to spots of a sterile and barren character. The male, like many of the saxicoline birds, frequently perches either on the summit of a stone, or on the extremity of a dead and leafless branch. It is rather shy in its disposition, and when disturbed flies off with considerable rapidity to the distance of two or three hundred yards before it alights again. I observed it in small companies on the plains near Adelaide, over the hard clayey surface of which it tripped with amazing quickness, with a motion that can neither be described as a hop or a run, but something between the two, with a bobbing action of the tail." Of its nidification nothing is known.

Family MERULIDÆ (THRUSHES).

This family contains many genera, which according to their mutual affinities may be arranged in minor groups, or subfamilies, according to the views of the naturalist who analyses them.

In placing under this title, Merulidæ, the Thrushes and Blackbirds, or Ouzels, the Pettæ and others, we follow the arrangement of Mr. Vigors, aware at the same time that some naturalists have collected the thrushes under a distinct family head, but we think on questionable grounds. We will not, however, discuss the point, but direct at once attention to our pictorial examples.

1450 (*c*).—The Song-Thrush

(*Turdus musicus*). Grive and Petite Grive of the French; Tordo and Tordo Botaccio of the Italians; Sing-drossel and Weiss-drossel of the Germans; Throstle or Mavis, provincial English; Aderyn Bronfraith of the ancient British.

This splendid songster is common over the greater portion of Europe, being migratory in Norway, Sweden, and the northern districts, but stationary in our island, and in France, Italy, and other parts of the south. As the winter advances, flights of thrushes arrive in Great Britain with a north or north-east wind, and, after staying a few days to recruit, move southwards.

The thrush is a hardy bird, and begins to enliven the woods and glens with his rich-toned notes even as early as the month of January if the season be temperate; and pairs, and commences the work of nidification in March. The nest is generally in a thick bush, amidst clustering ivy, or closely-tangled bowers of [illegible], in woods, or in full evergreens, as the Portugal laurel or holly. Externally it is composed of bent twigs, moss, and grass closely interwoven, being plastered within with a very thin smooth layer of rotten wood, cemented by glutinous saliva, and laid as a coating, or fine cement, upon a thick layer of cow-dung, scarcely carried so high as the brim of the nest. This lining is waterproof and tough, and well calculated for protecting the eggs or young from the keen winds of early spring. Fig. 1456 represents the nest of the song-thrush. Two broods are produced yearly. It may perhaps be fancy, but we think that we have heard a great difference in the power, variety, and richness of the notes of different individuals of this species: the notes of those that frequent the wooded rocks bordering the Bakewell Road near Buxton have always appeared to excel those of any others to which we ever listened; but perhaps this superiority was owing in some measure to the nature of their locality, the rocks reverberating the sound.

Worms, snails, slugs, insects, and berries constitute the food of the thrush. The common garden-snail (Helix hortensis) and the wood-snail (Helix nemoralis) are greedily devoured, the bird beating the shell against a stone till it is completely broken and the contents are disengaged.

1457, 1458.—THE WOOD-THRUSH

(*Turdus mustelinus*, Gmel.); Tawny Thrush, Pennant; Turdus melodus, Wilson.

In the woods of North America, this species represents our British songster; it is of shy, retiring habits, preferring the most secluded places, where the foliage of lofty trees overhangs murmuring streamlets, and forms a dense shade Its song, though composed of but few notes, is powerful, distinct, clear, and mellow, and is continued after sunset, various rivals endeavouring, as it would seem, to excel each other.

The nest of this species is usually placed in a low horizontal branch of the dogwood tree, and according to Audubon is composed externally of dry leaves, to which succeeds a layer of intertwined grasses, then a layer of mud, lined internally with fine fibrous roots. Description:—general colour above bright cinnamon brown, inclining to olive on the rump and tail; beneath, whitish, thickly marked with pencil-shaped dusky spots. Length eight inches.

1459 —THE RED-BREASTED THRUSH

(*Turdus erythrogaster*). This species is a native of the Himalaya Mountains, and is figured by Mr. Gould in his 'Century of Birds.' Of its habits we have no account.

The male is bluish grey above; with the cheeks, sides of the neck, and quill-feathers, black; the breast, under parts, and rump red.

The female differs in being of a bluish brown above, and having the under parts reddish white marked with transverse undulations of brown. The lower figure represents the female.

1460 (*a*).—THE FIELDFARE

(*Turdus pilaris*). La Litorne, Buffon; Merle Litorne, Temminck, Wachholder-drossel, Bechstein.

This species is a native of the cold regions of Norway, Sweden, Lapland, and other northern countries, whence as winter sets in it migrates southwards. It seldom visits our island before the latter part of November, and departs again northwards late in May. It breeds in pine or fir trees, and the eggs are bluish green spotted with reddish brown. During its winter sojourn with us the fieldfare associates in flocks, which, as long as the weather is open, frequent meadows and pasture-grounds, feeding upon worms, slugs, and the larvæ of insects, but resorting in severe frosts to hedges, copses, and plantations for the sake of the berries of the hawthorn, the holly, and the mountain-ash. The fieldfare is shy and wary, and not easily approached within gun-range, and consequently gives some trouble to the sportsmen, unless when, pressed by hunger, it be too much engaged in satisfying its appetite to attend to what passes around it.

This species is about ten inches long. The head and hind part of the neck are of a greyish colour, the former spotted with black; the bill is yellowish black at the point; the back and lesser wing-coverts chestnut; the breast and sides reddish yellow; tail blackish; legs black.

1460 (*b*) —THE REDWING

(*Turdus iliacus*). Merle mauvis, Temminck; Roth-drossel, Bechstein. Like the fieldfare, this species is a native of Norway, Sweden, &c., and visits our island about the latter part of October, associating in flocks, which, with those of the fieldfare, should the weather be severe, continue their migration still farther southwards. Yet it often happens that, during deep snows, numbers both of this species and of the fieldfare perish from hunger and cold.

The redwing is very similar to the throstle or common thrush, with which it is often seen among the hawthorn trees and ivy-bushes, or roaming over the meadows in search of food; but it is less in size, and has a white streak over the eye, which in that bird is wanting. It is about 8¼ inches in length, and of the average weight of 2¼ ounces

The bill is of a dusky colour, except at the base of the upper mandible, which partakes of a yellowish hue; the back and upper parts are brown, the lower part of the breast is white, marked with dusky lines, the body under the wings reddish orange, and the legs pale brown. There is also to be noticed the whitish streak over the eye mentioned above.

The song of the redwing, when heard in its native woods, has such a charming effect, heightened by the rough character of most of the other woodland sounds of the northern country, that the bird has been called the nightingale of Norway. With us, however, it does not appear to exert its vocal powers with such effect. Its common note is rather a harsh scream, though it has been compared by Mr. Slaney to "a sort of inward deep drawn sigh, like an attempt at ventriloquism." In fine weather, however, we may often hear them, while perched high on the trees, singing with a subdued voice in a very pleasing manner.

The redwing is known in different parts of England by the names of the red-sided thrush, the wind-thrush, and the swine-pipe.

1461.—THE NEST OF THE MISSEL THRUSH

(*Turdus viscivorus*). This species, which is common on the continent of Europe, is the largest of our British thrushes, but is not so abundant as the song-thrush, and more locally distributed. It frequents the outskirts of woods, large old orchards, and groves; and its song, uttered from the highest branch of some tall tree, is often heard in the month of January. The notes are loud, but the strain has little variety or richness. The nest is placed on the fork of a tree, very frequently of an apple tree of larger growth, and covered with moss or lichens. It consists of a basket-work of fine straws and grass, interwoven with moss and lichens. Within this structure is a layer of clay, the lining being of fine grass and fibres The eggs are of a greenish white, spotted with chestnut and clove-brown.

During the breeding season the missel thrush is very pugnacious, driving away all other birds from its nest, and defending itself and eggs with success against the magpie, while engaged in combat it utters a harsh scream. Its food resembles that of the song-thrush, in the winter it feeds much on the berries of the misseltoe, of which the seeds passing uninjured through the alimentary canal often germinate in suitable situations, and thus the parasitic shrub is propagated. It greedily devours cherries, raspberries, and other garden fruit.

1462 —THE GROUND-SCRAPING THRUSH

(*Turdus strepitans*). This species is a native of South Africa, where it was observed by Dr. A. Smith, who states that, immediately upon reaching Kurichane, this thrush began to appear in the thickets, and that he continued to acquire occasionally a specimen even in the vicinity of the tropic It seeks, he says, its food upon the ground, and when so occupied its resort is readily discovered by the natives from the noise it makes in scratching the ground, or in displacing rubbish and decayed leaves which conceal the insects it is seeking The name by which it is known in the country it inhabits is, he informs us, characteristic of the vigour with which it employs its feet, and the nearest translation he can give is 'Ground-Scraper'

Dr. Smith further remarks that the form of its bill, particularly towards the base, the length of its legs, and the shortness of its tail, are all characters which remove it from the more typical species of the genus Turdus, but yet there is in its structure and habits what necessarily constitutes it a true thrush ('Illustrations of the Zoology of South Africa.')

Description.—Front and top of head brownish grey; occiput, upper aspect of neck, interscapulars, scapulars, and shoulders deep yellowish grey, faintly shaded with brown, back, rump, and upper tail-coverts dirty ash-grey Under parts white, tinted in places with ochre-yellow, sides of the neck, whole of the breast, flanks, and belly variegated with blackish brown pyriform spots, one on each feather, the large end reaching nearly to its point. Sides of the head white, slightly tinted with ochre-yellow, variegated below the eyes with three blackish brown bands. Primary wing-coverts and primary quill-feathers deep brownish red, the latter tipped and edged externally with yellowish white; the first two-thirds at least of the inner vanes of these feathers are of a clear buff colour, darkest towards the shafts; secondary wing coverts and secondary and tertiary quill feathers dark greyish brown, the outer vanes lightest, all margined externally and tipped with dirty white. Eyes reddish brown; length 8¼ inches.

1450 (*d*).—THE BLACKBIRD

(*Merula vulgaris*). Merle noir, Temminck; Schwartz-drossel, Bechstein; Turdus Merula, Linn. This beautiful songster, with yellow bill and jet-black plumage, is too well known to need minute description. It is a shy bird, frequenting hedgerows, thickets, shrubberies, and large gardens, and when disturbed or surprised escapes into the covert of dense foliage, uttering a loud sharp cry of alarm. Its song is clear and melodious, but not so varied as that of the thrush. Like that bird it feeds upon slugs, shelled snails, and insects, and also upon currants, cherries, peas, &c., often making much havoc in the garden, as indeed does the thrush; but they both compensate for this by the destruction of snails and slugs, and by their melody.

Early in spring the blackbird begins its nest; a thickset hedgerow, an insulated bush of some dense evergreen, or a bower of ivy, are all favourite places. The outer frame-work of the nest consists of moss, small sticks, grasses, and fibres, with an inner coat of mud plaster, over which is a lining of fine dry grass (see Fig. 1463, the nest of the blackbird) The eggs are four or five in number, of a bluish green, variegated with darker markings, Fig. 1464. Two or even three broods are hatched and reared during the spring and summer.

The female of this species is brownish black above, the breast being pale umber brown, the margin of each feather passing into greyish white. Bill and legs blackish brown The young are similar to the females, and the males do not acquire their glossy black and orange yellow bill till after the second moult. White, and cream-white varieties, albinos in fact, are sometimes met with.

1465.—THE RING-OUZEL

(*Merula torquata*). Merle à plastron, Temminck; Merulo alpesto of the Italians Ring-drossel of the Germans, Rock-Ouzel and Tor Ouzel, provincial English. This bird is one of our summer visitors, arriving in our islands in the spring, and resorting to the mountain districts to breed. The mountains of Wales, Dartmoor in Devonshire, the rocky districts of Cornwall, the Peak of Derbyshire, the mountains of Scotland and the north of England, and those of Ireland, are annually visited. They haunt the wildest and most rocky parts of glens and ravines, and make their nest, which in form and texture resembles that of the blackbird, on some steep bank, under the covert of grass or heath, or on some shelf amidst mosses, which, the outside being made of the same materials, entirely conceal it from view, sometimes it is built in the fissure of a rock. The male utters his song, consisting of a few clear notes while perched on the top of some stone, or the summit of a rock; the song is not unlike that of the missel thrush, which bird the ring ouzel resembles in disposition during the breeding season, driving away other species, even flying round dogs and other animals, striking at them and uttering loud outcries The food of the ring-ouzel consists of insects and their larvæ, snails, slugs, &c. In October it leaves the kingdom, passing southwards, during the summer it is common in Sweden, France and Germany, but is very rare in Holland. Latham says this species is met with in the warmer and colder regions, as well as in Africa and Asia, but it does not inhabit either Russia or Siberia, though it is seen in Persia about the Caspian Sea.

The ring blackbird, or ring-ouzel, is larger than the common blackbird. Length, including the tail, about ten inches and a half. Bill blackish brown or raven grey, about an inch long, and yellowish at the base of the lower mandible; the irides chestnut-brown, and the legs dark brown The following is Selby's description of the plumage: "Upper parts of the body black, the feathers being margined with blackish grey. On the upper part of the breast is a large crescent-shaped gorget of pure white; the rest of the under parts black, margined with grey, greater wing-coverts deeply marginated with ash grey. Tail black.

"The plumage of the female bird is more clouded with grey, and the pectoral gorget is much smaller, and clouded with reddish brown and grey. In the young females this gorget is not visible, and in the young males it is of a reddish white.

"Varieties are sometimes found similar to those of the blackbird."

1466.—THE HERMIT-THRUSH

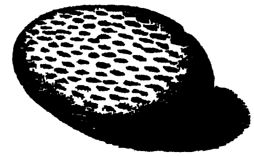
(*Turdus solitarius*, Wilson). The hermit-thrush is a native of the Southern States of North America, especially those of the Mississippi, where it resides during the winter. In Kentucky, Indiana, and Tennessee it is observed during the summer.

It prefers swampy and secluded cane-brakes and dark retreats, and flits low over the ground, gliding on rapid wings when disturbed, to the deepest coverts. There these birds breed, placing their nest on the low branch of some overshadowing tree, about

1461 —Nest of Missel Thrush

1457.—Wood-Thrush.

1465.—Ring Ousel.



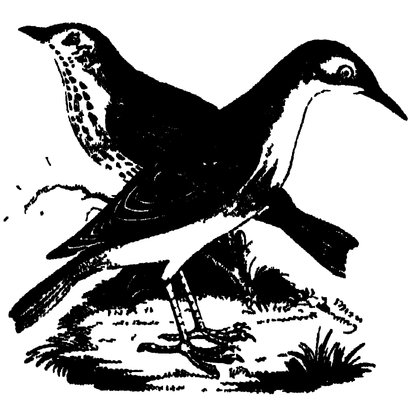
1464 —Egg of Blackbird.

1458 —Wood-Thrush.

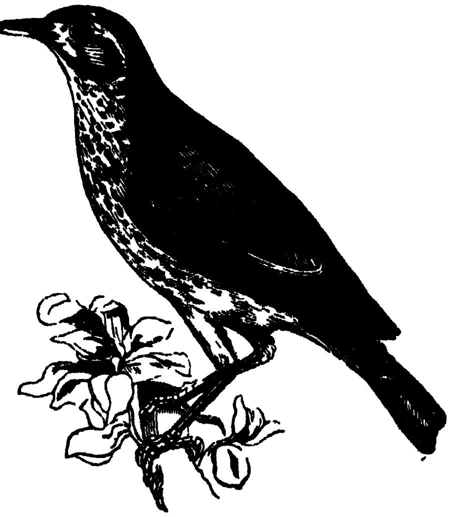
1459 —Red-breasted Thrushes.

1467 —Golden Oriole.

1463 Nest of Blackbird.

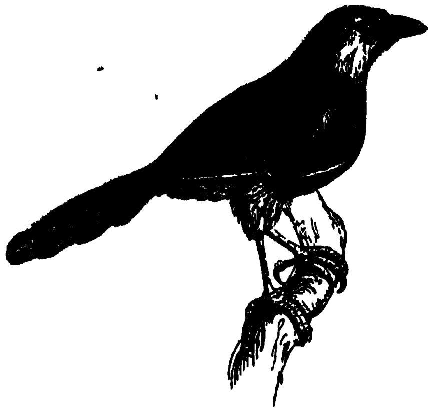


1466.—Hermit-Thrush.

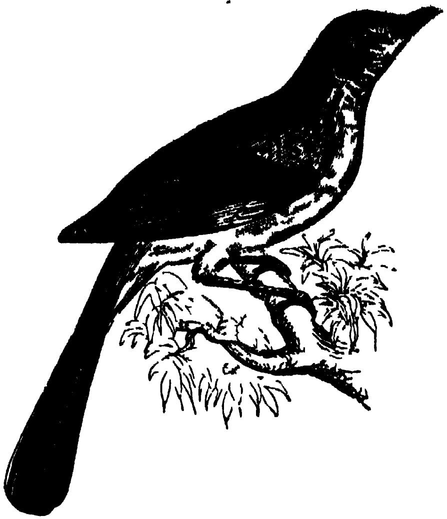


1462 —Ground-scraping Thrush.

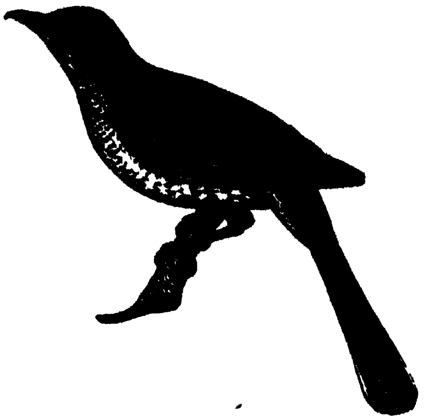
1468.—Nest of Golden Oriole.



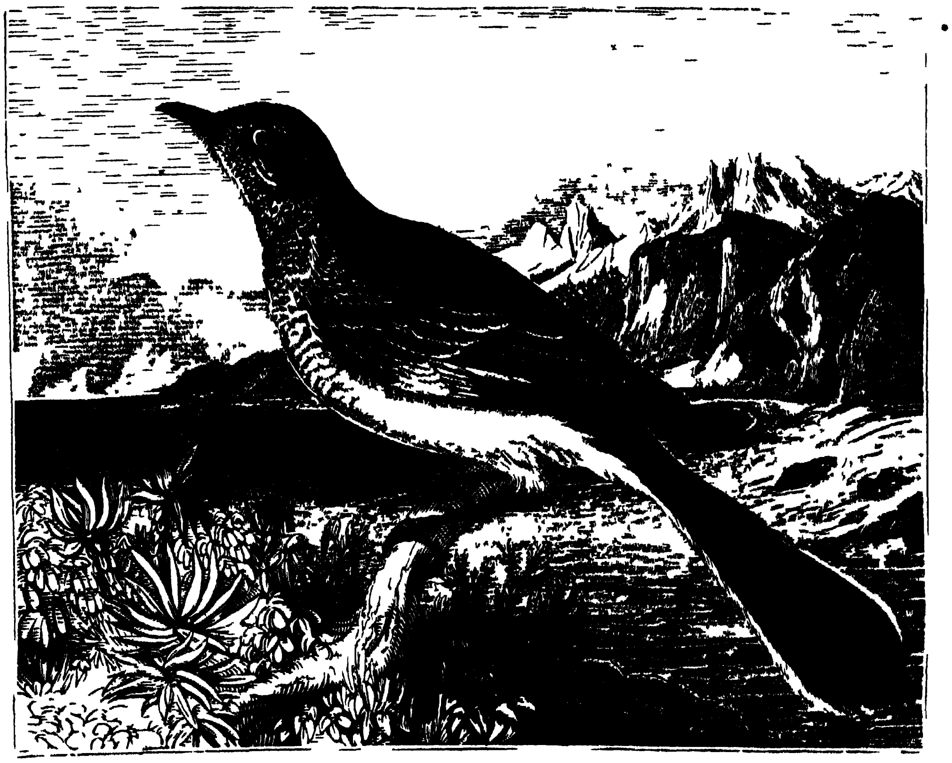
1473.—Chestnut-capped Timalia.



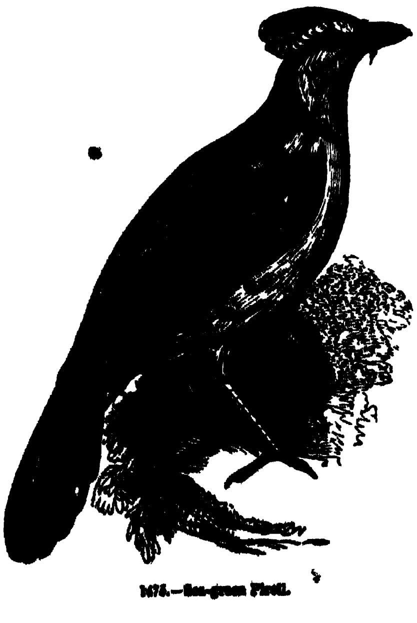
1471.—Mocking-Bird.



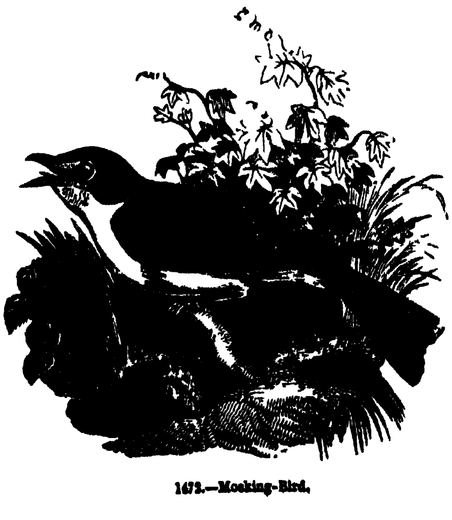
1470.—Mocking-Bird.



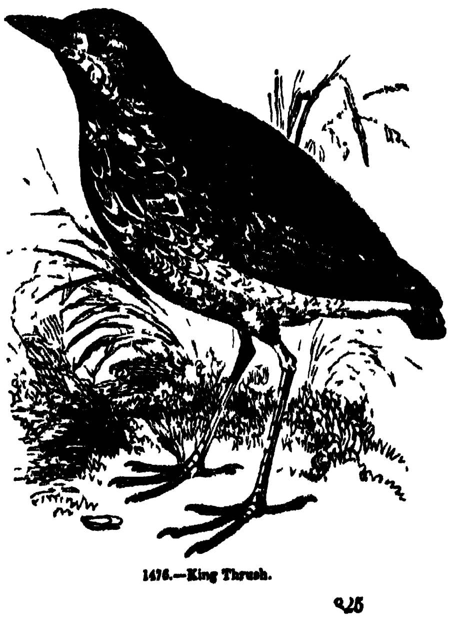
1469.—Mocking Bird



1475.—Sea-green Piroll.



1472.—Mocking-Bird.



1476.—King Thrush.

seven or eight feet from the ground, or even lower. The nest is destitute of any layer of mud, but is compact, consisting of dry weeds, leaves, and long grasses firmly intertwined; the inside is lined with slender fibres of grass arranged in a circular manner, and laid very smoothly and neatly. The eggs, from four to six, are of a light-blue colour sprinkled with dark dots about the large end. Two broods are reared during the summer. The male is altogether destitute of musical powers, and utters only a low plaintive cry, scarcely audible at the distance of thirty yards. The food of this species consists almost wholly of wild fruits and berries, which at all seasons abound in its native woods, such as those of the holly, myrtle, gall-bush (a species of vaccinium), the yapon shrub, &c. In the winter, when the swampy retreats which it affects during summer are flooded, the hermit-thrush retires to the nearest hills, and there, mixing with the wood-thrush and other species, remains till the spring.

The length of the hermit-thrush is seven inches. The general colour of the upper parts is yellowish brown, changing on the rump and tail into dull-yellowish red; quill-feathers dusky, margined externally with yellowish brown; under parts greyish white; the neck and breast spotted with dark brown.

A bird called the Solitary Thrush has been described by Col. Montagu, Mr. Knapp, and Bewick as a native of our island. The former writer says it frequents mountainous situations, and is always seen alone, except in the breeding season, preparing its nest like the starling in old ruined edifices, church-towers, and other similar places, but no two nests are ever found in the same place; the young, he adds, are easily brought up, and repay the trouble by their sweet native song. The bird is described as being of a pale yellowish brown, mottled with a darker shade.

Mr. Knapp, writing in Gloucestershire, says, "It is not an uncommon bird with us, breeding in holes and hollows of trees, and hatching early." This bird is undoubtedly not the hermit-thrush of America, an opinion which some, strange to say, have entertained; we believe it to be a mere variety of the common starling, and no thrush at all. Selby asserts that it is the young of the starling in its first dress, previous to the autumnal moult; but if, as asserted, it breeds, this cannot be the case; a variety, however, it may be. We have never seen it. The anterior figure at 1466 represents this misnamed bird; it is copied from Montagu's delineation, and the form of the beak and outline of the head are sufficient to prove its true character. The figure behind it is the hermit-thrush of America.

1467.—The Golden Oriole

(*Oriolus galbula*). This is supposed by Bélon and others to be the χλωρίων of the Greeks: Galgulus, Vireo, and Oriolus, Lat., and the Picus of which Pliny (book x., c. 33) speaks as suspending its nest on a twig of the topmost branches of a tree, after the manner of a cup. It is the Becquafiga, Brusola, Galbedro, Garbella, Giallone, and Gravolo gentile of the modern Italians; and Rigogolo commune of the 'Stor. degl. Ucc.'; Turiol of the Spanish; Loriot, Compère Loriot, and Orio of the French; Gelbe Rache, Gelber Pirol, der Pyrold, Wiedewal, &c., of the Germans and Netherlanders; Goutmerle of the Low Dutch; Witwall of Willughby and Ray; and y Fwyalchen felen of the ancient British.

In the genus Oriolus the beak is broad at the base, notched and somewhat bent at the tip. Wings rather long; tarsi short. The species are all natives of the Old World, where they tenant the recesses of woods in pairs, building most artful nests.

The Golden Oriole, which may be regarded as the type of the genus, is only an occasional visitor to our islands, making its appearance in April; it has been found in Hampshire, Devonshire, Cornwall; near Manchester, near Lancaster; near Walton in Surrey, and near Godalming; at Cheshunt (Herts); near Saxmundham in Suffolk; in Norfolk; at Tynemouth in Durham; and in South Wales. It has been seen, though rarely, in Ireland, but never, as far as we can learn, in Scotland.

On the Continent it advances as high northwards as Sweden, where it occasionally breeds; it also visits some of the districts of Russia, and is found in Germany and Holland, but more plentifully in France, Spain, and Italy, everywhere being a bird of passage. The Prince of Canino says that it arrives near Rome in the spring and departs in autumn. It is found in Malta and Greece, and along the whole of the northern line of Africa.* An allied, but distinct species is common in India.

The Golden Oriole is a shy and suspicious bird, haunting lonely groves and thickets on the skirts of woods, excepting in the fruit season, when it always frequents orchards, to the no small loss of the owner. It is difficult to get near these birds, though they are sometimes approached by the sportsman, under the deception of his imitative whistle; but it requires great accuracy both of lips and ear to perform this fraud, for the least mistake, or one false note, will send the bird off at once. The food consists of insects and their larvæ, berries, and fruits, among which figs, grapes, and cherries are favourites. The whistle of the oriole is loud but flute-like, and Bechstein expresses the sound by the word *puhlo*. The cup or rather saucer shaped nest is formed of wool and slender grass-stems, and placed in the fork of a tall branch, usually towards its extremity.

The eggs are generally four or five, purplish white with a few ash-grey and claret spots, and the female watches over them with such maternal care, that it is said she will suffer herself to be taken rather than abandon them. In this country nests have been taken in Suffolk and Norfolk. Fig. 1468 represents the nest of this species.

The Golden Oriole gets very fat after its summer feed of fruits. Willughby saw many of them in the poulterers' shops at Naples, and says that "it hath very delicate flesh, and yields wholesome nourishment."

Description.—Male:—Golden yellow, a blackish-brown spot between the eye and the bill; wings and tail black; a yellow spot on the quills, not far from the middle of the wing when closed; and the tail-feathers terminated with yellow; bill reddish maroon; iris red; feet bluish grey. Length, rather more than ten inches. Mr. Hoy agrees with Mr. Yarrell that the male does not obtain its brilliant yellow and black till the third year.

Female:—Greenish-olive above; greyish-white with a yellowish tint below, where the plumage is marked by somewhat distant greyish-brown short stripes or dashes disposed longitudinally; wings brown, bordered with olivaceous grey; tail olivaceous tinged with black; yellowish beneath with a brownish black mark somewhat in the form of an irregular Y; no dark streak behind the bill and the eye.

The young of the year resemble the female; but the longitudinal stripes of the lower parts are more numerous and deeper in colour; bill blackish grey and iris brown. The upper figure represents the female, the lower the male.

1469, 1470, 1471, 1472.—The Mocking-Bird, or Polyglot Thrush

(*Orpheus Polyglottus*). Turdus Polyglottus, Wilson.

We have several pictorial specimens of this celebrated bird, which if it be not overpraised, stands unrivalled in powers of song; it is a native of the New World, and, according to Wilson, whose history we follow, it inhabits a very considerable extent of both North and South America, having been traced from the States of New England to Brazil, and also among many of the adjacent islands. They are, however, much more numerous in those States south than those north of the river Delaware, being generally migratory in the latter, and resident (at least many of them) in the former. A warm climate, and low country not far from the sea, seem most congenial to their nature; the species is accordingly found to be less numerous to the west than east of the great range of Alleghany, in the same parallels of latitude. In these regions the berries of the red cedar, myrtle, holly, many species of smilax, together with gum berries, gall berries, and a profuse variety of others, abound, and furnish them with a perpetual feast. Winged insects also, of which they are very fond, and which they are very expert in catching, are there plentiful even in the winter season.

The precise time at which the mocking-bird begins to build his nest varies according to the latitude in which he resides, from the beginning of April to the middle of May. There are particular situations to which he gives the preference. A solitary thorn-bush, an almost impenetrable thicket, an orange-tree, cedar, or holly bush, are favourite spots and frequently selected. It is no great objection to the bird that a farm or mansion-house happens to be near; always ready to defend, but never over-anxious to conceal, his nest, he very often builds within a small distance of the house, and not unfrequently in a pear or apple tree, rarely at a greater height than six or seven feet from the ground. The nest varies a little according to the conveniency of collecting suitable materials. Generally it is composed of, first, a quantity of dry twigs and sticks, then withered tops of weeds of the preceding year, intermixed with fine straw, hay, pieces of wood and tow; and lastly, a thick layer of fine fibrous roots, of a light brown colour, lines the whole. The female sits fourteen days, and generally produces two broods in the season, unless robbed of her eggs, in which case she will even build and lay the third time. She is, however, very jealous of her nest, and very apt to forsake it if much disturbed.

During the period of incubation, neither cat, dog, animal, nor man can approach the nest without being attacked. The cats, in particular, are persecuted whenever they make their appearance, till obliged to retreat. But his whole vengeance is more particularly directed against that mortal enemy of his eggs and young, the black snake. Whenever its insidious approaches are discovered, the male darts upon the reptile with the rapidity of an arrow, dexterously eluding its bite, and striking it violently and incessantly about the head, where it is very vulnerable. The snake soon becomes sensible of its danger, and seeks to escape; but the intrepid defender of his young redoubles his exertions, and, unless his antagonist be of great magnitude, often succeeds in destroying him. All his pretended powers of fascination avail it nothing against the vengeance of this noble bird. As the snake's strength begins to flag, the mocking-bird seizes and lifts it up partly from the ground, beating it with its wings, and when the business is completed, he returns to the nest of his young, mounts the summit of the bush, and pours forth a torrent of song in token of victory.

The plumage of the mocking-bird is soberly coloured, but the figure of the bird is very graceful and well proportioned. The ease, elegance, and rapidity of his movements, the animation of his eye, and the intelligence which he displays in listening and laying up lessons from almost every species of the feathered race within his hearing, are really surprising, and mark the peculiarity of his genius. To these qualities may be added that of a voice full, strong, and musical, and capable of almost every modulation, from the clear mellow tones of the wood-thrush to the savage scream of the bald eagle. In measure and accent he faithfully follows his originals; in force and sweetness of expression he greatly improves upon them. In his native groves, mounted on the top of a tall bush or half-grown tree, in the dawn of the morning, while the woods are already vocal with a multitude of warblers, his admirable song rises pre-eminent over every competitor. The ear can listen to his music alone, to which that of all the others seems a mere accompaniment. Neither is his strain altogether imitative. His own native notes are bold and full, and varied seemingly beyond all limits. They consist of short expressions of two, three, or, at the most, five or six syllables, generally interspersed with imitations, and all of them uttered with great emphasis and rapidity, and continued with undiminished ardour for half an hour or an hour at a time. His expanded wings and tail glistening with white, and the buoyant gaiety of his action, arresting the eye as his song most irresistibly does the ear, he sweeps round with enthusiastic ecstasy, and mounts and descends as his song swells or dies away. While thus exerting himself, a bystander destitute of sight would suppose that the whole feathered tribes had assembled together on a trial of skill, each striving to produce his utmost effect. He often deceives the sportsman, and sends him in search of birds that are not, perhaps, within miles of him, but whose notes he exactly imitates: even birds themselves are frequently imposed upon by this admirable mimic, and are decoyed by the fancied calls of their mates, or dive with precipitation into the depth of thickets at the scream of what they suppose to be the sparrow-hawk.

The mocking-bird loses little of the power and energy of his song by confinement. In his domesticated state, when he commences his career of song, it is impossible to stand by uninterested. He whistles for the dog; Cæsar starts up, wags his tail, and runs to meet his master. He squeaks out like a hurt chicken, and the hen hurries about with hanging wings and bristled feathers, chuckling to protect its injured brood. The barking of the dog, the mewing of the cat, the creaking of a passing wheelbarrow, are followed with great truth and rapidity. He repeats the tune taught him by his master, though of considerable length, fully and faithfully; he runs over the quaverings of the canary, and the clear whistlings of the Virginian nightingale, or red-bird, with such superior execution and effect, that the mortified songsters feel their own inferiority, and become altogether silent, while he seems to triumph in their defeat by redoubling his exertions.

This excessive fondness for variety, however, in the opinion of some injures his song. His elevated imitations of the brown thrush are frequently interrupted by the crowing of cocks; and the warblings of the blue-bird, which he exquisitely manages, are mingled with the screaming of swallows or the cackling of hens. Amidst the simple melody of the robin, one is suddenly surprised by the shrill reiterations of the whip-poor-will, while the notes of the kildeer, blue jay, martin, baltimore, and twenty others, succeed, with such imposing reality, that the auditors look round for the originals, and with astonishment discover that the sole performer in this singular concert is the admirable bird now before us. During this exhibition of his powers, he spreads his wings, expands his tail, and throws himself around the cage in all the ecstasy of enthusiasm, seeming not only to sing but to dance, keeping time to the measure of his own music. Both in his native and domesticated state, during the stillness of the night, as soon as the moon rises, he begins his delightful solo, making the whole neighbourhood resound with his inimitable medley.

The mocking-bird is frequently taken in trap-cages, and, by proper management, may be made sufficiently tame to sing. The usual price of a singing-bird is from seven to fifteen, and even twenty dollars. Mr. Wilson has known fifty dollars paid for a remarkably fine singer; and one instance where one hundred dollars were refused for a still more extraordinary one. Attempts have been made to induce these charming birds to pair and rear their young in a state of confinement, and the result has been such as to prove it, by proper management, perfectly practicable.

The mocking-bird is about nine inches and a half long. The general colour of all the upper parts is a dark-brownish ash. The quill-feathers and coverts are brownish-black, the former white at their base, and covered there by the white feathers of the spurious wing, which have a black spot at the tips; the latter slightly tipped with white. The two middle tail-feathers dusky black, the rest more or less extensively white on their inner vane, except the outermost on each side, which is wholly white; under parts generally pale-greyish brown: iris yellow, inclining to a pale gold-colour. Bill and legs black. The plumage of the female is duller than that of the male.

The genus Orpheus approaches closely to Merula, but the bill is more curved, the notch obsolete, the wings rounded, and the tail lengthened and graduated.

1473.—THE CHESTNUT-CAPPED TIMALIA

(*Timalia pileata*). In the genus Timalia the bill is strong, deep, and compressed; the wings are short and rounded; the tail elongated and graduated; the feet large and robust; the hind claw much developed.

Dr. Horsfield states that a peculiar character is exhibited to both the species of Timalia recorded by him in the structure of the plumes, which cover the back and the upper parts of the neck, as well as the breast, belly, and thighs He remarks that the separate filaments (*radii* of Illiger), which constitute the vanes or webs of those plumes, are not in close contact, as is generally the case, but being inserted into the shaft at a small distance from each other, they diverge with perfect regularity. "The parts which they cover," says Dr. Horsfield in continuation, "are accordingly marked with delicate parallel lines, and wherever several plumes lie over each other, they form a beautiful reticulation On the posterior part of the abdomen and the thighs, the plumes have a similar structure; but the filaments are greatly elongated and pendulous, so as to envelop those parts with a lax plumose covering, which, on near inspection, appears covered with delicate hairs. This appearance is produced by a series of very minute parallel villi, on each of the separate filaments, arranged with great regularity and beauty."

We learn from the same authority that the chestnut-capped Timalia is not unfrequent in the groves and small woods which abound throughout Java. It often approaches villages and plantations, constructing its nest in the hedges, and he speaks of it as one of the social birds that delight to dwell in the vicinity of cultivation. In large forests he did not notice it. He describes its flight as low and interrupted, and adds that wherever it resides it is a welcome neighbour, in consequence of the peculiarity and pleasantness of its note, which consists of a slow repetition of the five tones of the diatonic scale (C, D, E, F, G), which it chants with perfect regularity, several times in succession, and at small intervals of time. Dr. Horsfield further remarked that the sixth tone was sometimes added; but as this required apparently an extraordinary effort, it was by no means so agreeable to a musical ear as a simple repetition of the five notes, which appeared to be the natural compass of the bird's organs. ('Zoological Researches in Java.')

This bird is rather stoutly made. General colour above, brown with an olivaceous tint; underneath, testaceous inclining to grey. Head capped with saturated chestnut. Throat and cheeks white. Breast white, inclining to grey, marked with intensely black stripes by the shafts of the plumes. A narrow white band commences at the forehead, near the base of the bill, passes backward, encircles the eye, and unites with the white plumes of the cheeks. Bill black; feet brown.

1474.—THE GIANT BREVE

(*Pitta Gigas*). Under the name of Myiotheræ, Illiger and Cuvier have united several genera composing the Breves of Buffon, and the Ant-Thrushes properly so called. These breves are remarkable for the vivid and strongly-contrasted hues of their plumage, for the length of the legs, and the shortness of the semi-erect tail. They are only found in India and the adjacent islands, and Australia, whilst the ant-thrushes belong to the New World as well as the Old. The breves have the gradually-curved bill of the true thrushes, but much stronger: the wings are short, and the powers of flight feeble. The predominant colour is metallic green, variegated with azure-blue, scarlet, and black; and some species with a hood of the latter tint appear to be confined to Australia, and the neighbouring islands of the Indian seas. To the breves is allied the genus termed Chlorosoma of Swainson (called by some writers by the barbarous and unmeaning name of Kitta), notwithstanding the greater comparative length of the tail, and its graduated form The ant-thrushes, principally confined to tropical America, represent the breves in that portion of the world, but differ from those splendid birds in having an abruptly-hooked and strongly-toothed bill, and soberly-coloured plumage.

The utility of the ant-thrushes in their native regions is thus commented upon by Mr Swainson —"Of all the tribes of insects which swarm in the tropics, the ants are the most numerous; they are the universal devastators, and in the dry and overgrown forests of the interior the traveller can scarcely proceed five paces without treading upon their nests To keep these myriads within due limits, a wise Providence has called into existence the ant thrushes, and has given to them this particular food. Both are proportionate in their geographic range, for beyond the tropical latitudes the ants suddenly decrease, and their enemies, the Myiotheræ, totally disappear. As a general distinction by which this family may be known from the bush shrikes, we may mention the difference in the feet,—the structure of one being adapted for walking, while that of the other is more suited for perching The ant thrushes are very locally distributed, for, although the group is tropical, we frequently found that a particular species, very common in one forest, was replaced in another by a second, while a third locality in the same district would present us with still another kind, different from those we had previously found Cayenne and Surinam, in like manner, furnish us with many species totally unknown in the forests of Brazil."

To return to Pitta We select, as an example, Pitta Gigas, Breve Geant, or Giant Pitta.

This species in size is equal to a magpie, but the tail is short and squared, and the wings cover it entirely. A very brilliant azure blue covers the back, the scapulars, the rump and tail a less vivid tint is spread over the wings, the quills of which are black, coloured with azure towards the tips, summit of the head, nape, and demi-collar of the lower part of the neck black; feathers of the front and eyebrows ashy brown; throat whitish an ashy brown tint is spread over all the lower parts, the feet are very long and of a horny ash-colour Total length nine inches.

Locality—Sumatra (Temm)

1475—THE SEA-GREEN PIROLL.

(*Chlorosoma thalassinum*) Kitta thalassina, Piroll thalassina of Temminck This gorgeous bird is a native of Java and Sumatra The greater part of the plumage is very brilliant celadon-green, a velvety black band springs at the angle of the bill, passes backwards so as to include the eye, and surrounds the occiput, tail deep tarnished green; wings reddish, but the three or four secondary feathers nearest the body are opaline bluish ash, iris, bill, and feet very bright vermilion red Total length, eleven inches two or three lines. The male and female have nearly the same livery.

The young of the year differ in the colour of their bill and feet, which are black; in that of the wings, which is a tarnished rusty red, and in the very clear blue, which is nearly whitish, of all the rest of the plumage. This blue tint is more vivid in middle age, and passes by degrees from bright azure blue to celadon-green. Individuals during moult have the plumage varied, with these two tints very vivid and pure.

1476.—THE KING-THRUSH

(*Grallaria Rex*) Roi des Fourmiliers, Buffon; Turdus Rex Gmelin. This species is a native of Guiana and Brazil, and is about the size of a quail; its legs are extremely long, and the tail abbreviated to the utmost. It lives alone, prying about under bushes and in thickets for its food. The general colour is brown, with a tinge of red, prettily variegated; the back of the head is lead-colour; the under parts are paler than the upper.

1477.—THE WATER-OUZEL

(*Cinclus aquaticus*). Lerlichirollo and Merlo acquatico of the Italians; Torda de Agua of the Spaniards; Merle d'Eau, Aguassière à gorge blanche of the French; Watnstare of the Swedes; Fosse-fald, Fosse-kald, Quærn-kald Stroem-stær, and Bække Engl of the Norwegians; Wasser-amsel and Der Hochköpfige mittlere und Nordische Wasserschwätzer of the Germans; Waterspreecud of the Netherlands; Mwyalchen y divir of the ancient British; Water-piet, Dipper, and Bessy-ducker provincial English.

This species is spread over the greater portion of Europe, but is more rare in the northern regions than in our islands and the south. Specimens have been received from India and Japan. It is amidst romantic and picturesque scenery, where mountain streams and rivulets, winding through glens and rock-girt dales, sparkle over a rocky bed, that this elegant and active bird is to be sought for. It is common in Wales, Scotland, and Ireland, and the hilly parts of England. We have seen it in abundance in Derbyshire, along the course of the Wye between Buxton and Bakewell, on the Dove, on the Derwent at Matlock, and in various other places, where we have watched its singular habits. It is active, restless, and full of animation: its movements are all quick and alert, and it flits from stone to stone, flying low and rapidly over the bubbling water. Often may it be seen perched on a portion of rock jutting out of the water in the centre of the stream; and there, conspicuous by its snowy breast, contrasted with the deep russet brown of the rest of its plumage, it will remain for a short time dipping its head and jerking its tail in an odd sort of manner, reminding us of the wren. In an instant it will disappear, diving beneath the water, and, emerging at a considerable distance, again settle on some stone or crag, and utter a low but very sweet and pleasing strain Again it will dive or fly off to another resting-place, jerk its tail, and sing, dipping and moving its head, and again start off to a more attractive pedestal We have heard its song in bright mornings during winter, as well as in the spring and summer, and it exhibits equal animation, entering the water, and flitting from stone to stone, in the cold and in the warmer months. How this bird manages to keep itself submerged and proceed at the bottom of the stream, is not very well understood Mr Thomson says, "On the 26th of September, a pair of water-ouzels at the upper pond of Wolfhill (near Belfast) plunged several times into the water, which was some feet deep, and remained moving about in it, with only their heads above the surface, twice one of them disappeared altogether for a few seconds, they then pursued each other round the pond and alighted, when one of them sang, and they repeated over again several times all these manœuvres" In these aquatic habits we are reminded of the water rail.

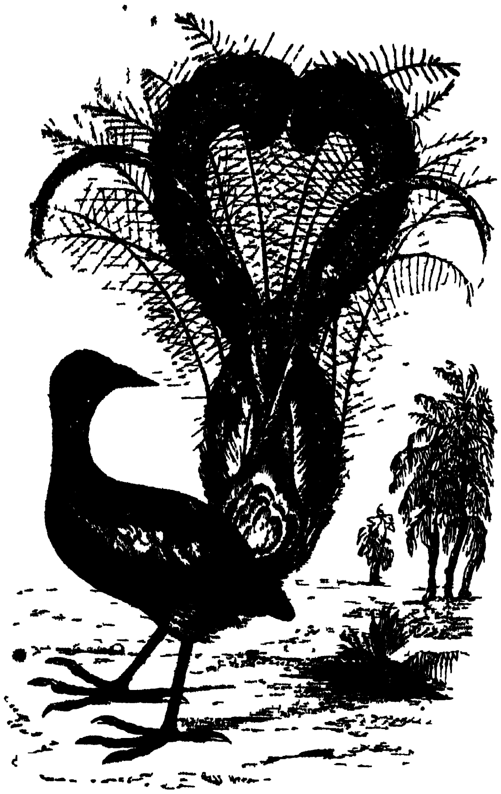
The food of the water-ouzel consists of insects, aquatic larva, minute fresh-water shelled snails, and the fry of fishes

The nest of this bird is most artfully concealed, we have seen it in the fissure of a low jutting crag overhanging the rushing and bubbling current, and also between the green damp stones of a rude bridge The structure itself is composed of intertwined mosses, and is of large size, and domed, with a small lateral aperture leading to the interior chamber, which is lined with a few dried leaves. Sometimes it is so placed that the sheet of water falling from an elevated rock and forming a cascade completely screens it, but wherever situated it blends with the rest of the moss and lichen, which fills up every chink, and spreads over the face of the humid rocks in great luxuriance, and, unless the bird be watched to its retreat, would never be detected. Fig. 1478 represents the nest of the water-ouzel. The eggs, five in number, are white. As soon as the young are fledged they accompany their parents, following them in all their movements, playfully sporting, diving, flitting from stone to stone, and performing the most amusing evolutions. On the Continent the water ouzel is very common in Switzerland and in the rocky parts of Italy. Several pairs are always observable about the fall of Velino near Terni.

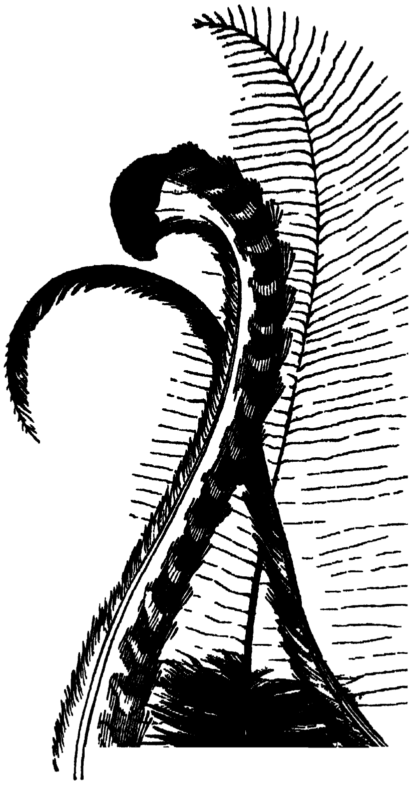
The genus Cinclus is characterized by the beak being straight and somewhat turned up, compressed laterally, and blunt at the tip, the wings rounded; the tarsi long; the feet large Besides the European species there are two Indian, and one a native of America. The water ouzel is about seven inches in length; the upper parts are of a deep brown; the throat and chest white, the under parts rusty; iris pearl grey, bill black; legs horn-coloured. In the young bird the plumage above is clouded with blackish undulations, and the white feathers of the chest are finely varied with brown and ash-colour. The lower figure (Fig. 1477) is that of a young bird.

Family MENURIDÆ.

This family is suggested from the Lyre-bird of Australia and several allied groups, as Stipiturus, Amytis, Dasyornis, Psophodes, &c., which in struc-



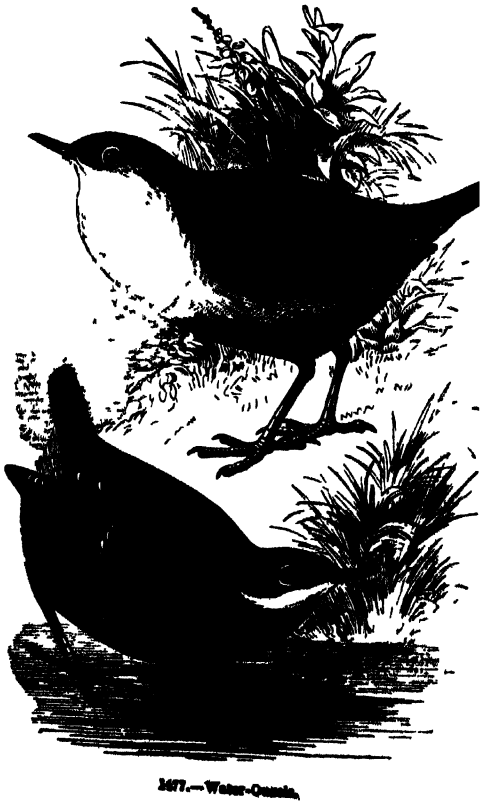
1479.—Lyre-Bi



1481.—Tail-feath

1474.—Giant Breve.

1480.—Lyre-Birds.



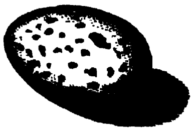
1477.—Water-Ouzels.

1484.—Nest of Yellow Hammer.

1485.—Ortolans.

1486.—Scarlet Tanager.

1490.—Canary Finch and Nest.



482. —Egg of Lark.

ial .nd Nest.

1487.—Snow-Birds.

.482 —Group of Buntings.

ture, if not in size, closely approximate to the Menura superba, most erroneously regarded by some ornithologists as one of the Gallinaceous order. It is a song-bird of the Insessorial order, and is related in some respects to certain forms of the Thrush tribe, in other respects to some of the Wren.

1479, 1480.—The Lyre-Bird

(*Menura superba*). It is to that eminent ornithologist Mr. Gould that we owe our knowledge of the habits of this species, which he himself diligently investigated in its native country; and we shall therefore proceed, with his permission, to transcribe his valuable observations.

"Perhaps no bird has more divided the opinion of ornithologists, as to the situation it should occupy in the natural system, than the Menura; and although more than fifty years have now elapsed since the bird was discovered, little or no information has been hitherto published respecting its economy and habits, as ornithologists have had only its external structure to guide them in their opinions. Aware of this fact, I paid considerable attention to the subject while in Australia, and after a minute observation of the bird in a state of nature, I am decidedly of opinion that it has not, as has been very generally considered, the most remote relationship to the Gallinaceæ; but that it forms, with the American genera Pteroptochos, Scytalopus, and their allied group, a family of the Insessorial order, to which Troglodytes, Amytis, Stipiturus, Malurus, Dasyornis, and Psophodes closely assimilate in their habits, and of which they will in all probability be hereafter found to form a part. Notwithstanding the great size of the Menura and the extraordinary form of its tail, in almost every other point it presents a striking resemblance to its minute congeners: like them it possesses the bristles at the base of the bill, but to a less extent, the same unusual mass of loose, flowing hair-like feathers on the back and rump, the same extraordinary power of running and the like feebleness of flight; all which will, I trust, render it evident that there are sufficient grounds for the opinion I have here expressed. Many intervening genera will, doubtless yet be discovered to complete the series of affinities; at all events, if, as I am informed is the case, the young of Menura are helpless and blind when hatched, it cannot with propriety be placed with the Gallinaceæ.

"In the structure of its feet, in its lengthened claws, and in its whole contour, the lyre-bird presents the greatest similarity to the Pteroptochos megapodius of Kittlitz. Another singular circumstance, by which their alliance is rendered still more evident, is the fact that Pteroptochos differs from the other families of the Insessorial order in having fourteen feathers in its tail, and that Menura also differs in the same particular in possessing sixteen. The immense feet and claws of these two birds admirably adapt them for the peculiar localities they are destined to inhabit, and the same beautiful modification of structure is observable in the other genera, equally adapting them for the situations they are intended to fulfil. Thus the Menura passes with ease over the loose stones and the sides of rocky gullies and ravines, while the Maluri trip over the more open and even ground, and the Dasyorni with equal facility thread the dense shrubs and reed-beds.

"The great stronghold of the lyre-bird is the colony of New South Wales, and, from what I could learn, its range does not extend so far to the eastward as Moreton Bay; neither have I been able to trace it to the westward of Port Philip, on the southern coast; but further research can alone determine these points. It inhabits equally the brushes on the coast, and those that clothe the sides of the mountains in the interior; on the coast it is especially abundant at the Western Port and Illawarra; in the interior the cedar brushes of the Liverpool range, and, according to Mr. G Bennett, the mountains of the Tumat country, are among the places of which it is a denizen.

"Of all the birds I have ever met with, the Menura is far the most shy and difficult to procure. While among the mountains I have been surrounded by these birds, pouring forth their loud and liquid calls, for days together, without being able to get a sight of them; and it was only by the most determined perseverance and extreme caution that I was enabled to effect this desirable object; which was rendered more difficult by their often frequenting the almost inaccessible and precipitous sides of gullies and ravines, covered with tangled masses of creepers and umbrageous trees: the cracking of a stick, the rolling down of a small stone, or any other noise, however slight, is sufficient to alarm it; and none but those who have traversed these rugged, hot, and suffocating brushes, can fully understand the excessive labour attendant on the pursuit of the Menura. Independently of climbing over rocks and fallen trunks of trees, the sportsman has to creep and crawl beneath and among the branches with the utmost caution, taking care only to advance when the bird's attention is occupied in singing, or in scratching up the leaves in search of food; to watch its action it is necessary to remain perfectly motionless, not venturing to move even in the slightest degree, or it vanishes from sight as if by magic. Although I have said so much on the cautiousness of the Menura, it is not always so alert; in some of the more accessible brushes through which roads have been cut, it may frequently be seen, and on horseback even closely approached, the bird evincing less fear of those animals than of man.

"At Illawarra it is sometimes successfully pursued by dogs trained to rush suddenly upon it, when it immediately leaps upon the branch of a tree, and its attention being attracted by the dog below barking, it is easily approached and shot. Another successful mode of procuring specimens is by wearing a tail of a full-plumaged male in the hat, keeping it constantly in motion, and concealing the person among the bushes, when the attention of the bird being arrested by the apparent intrusion of another of its own sex, it will be attracted within the range of the gun: if the bird be hidden from view by surrounding objects, any unusual sound, as a shrill whistle, will generally induce him to show himself for an instant, by causing him to leap with a gay and sprightly air upon some neighbouring branch to ascertain the cause of the disturbance; advantage must be taken of this circumstanee immediately, or the next moment it may be half way down the gully. The Menura seldom, if ever, attempts to escape by flight, but easily eludes pursuit by its extraordinary power of running. None are so efficient in obtaining specimens as the naked black, whose noiseless and gliding steps enable him to steal upon it unheard or unperceived, and with a gun in his hand he rarely allows it to escape, and in many instances he will even kill it with his own weapons.

"The lyre-bird is of a wandering disposition, and although it probably keeps to the same brush, it is constantly engaged in traversing it from one end to the other, from the mountain base to the top of the gullies, whose steep and rugged sides present no obstacle to its long legs and powerful muscular thighs; it is also capable of performing extraordinary leaps, and I have heard it stated that it will spring ten feet perpendicularly from the ground. Among its many curious habits, the only one at all approaching to those of the Gallinaceæ is that of forming small round hillocks, which are constantly visited during the day, and upon which the male is continually tramping, at the same time erecting and spreading out its tail in the most graceful manner and uttering its various cries, sometimes pouring forth it natural notes, at other mocking those of other birds, and even the howling of the native dog (Dingo). The early morning and the evening are the periods when it is most animated and active.

"It may truly be said that the beauty of this bird lies in the plumage of his tail, the new feathers of which appear in February and March, but do not attain their full beauty until June: during this and the four succeeding months, it is in its finest state; after this the feathers are gradually shed, to be resumed again at the period above stated. Upon reference to my journal I find the following notes upon the subject:—'March 14, Liverpool range.—Several Menuras killed to-day: their tails not so fine as they will be. October 25.—I find this bird is now losing its tail feathers, and judging from appearance, they will be all shed in a fortnight.'

"Although upon one occasion I forced this bird to take wing, it was merely for the purpose of descending a gully, and I am led to believe that it seldom exerts this power unless under similar circumstances. It is particularly partial to traversing the trunks of fallen trees, and frequently attains a considerable altitude, by leaping from branch to branch. Independently of a loud full note, which may be heard reverberating over the gullies for at least a quarter of a mile, it has also an inward warbling song, the lower notes of which can only be heard within about fifteen yards. It remains stationary while singing, fully occupied in pouring forth its animated strain. This it frequently discontinues abruptly and again commences with a low, inward, snapping noise ending with an imitation of the loud and full note of the satin-bird, and always accompanied by a tremulous motion of the tail.

"The food of the Menura appears to consist principally of insects, particularly centipedes and coleoptera; I also found the remains of shelled snails in the gizzard, which is very strong and muscular.

"I regret that circumstances did not admit of my acquiring a perfect knowledge of the nidification of this very singular bird; I never found the nest but once, and this unfortunately was after the breeding season was over; but all those of whom I made inquiries respecting it agreed in assuring me that it is either placed on the ledge of a projecting rock, at the base of a tree, or on the top of a stump, but always near the ground; and a cedar-cutter whom I met in the brushes informed me that he had once found a nest, which was built like that of a magpie, adding that it contained but one egg. The natives state that the eggs are two in number, of a light colour, freckled with spots of red The nest seen by myself, and to which my attention was drawn by my black companion Natty, was placed on the prominent point of a rock, in a situation quite secluded from observation behind, but affording the bird a commanding view and an easy retreat in front; it was deep and shaped like a basin, and had the appearance of having been roofed; was of a large size, formed outwardly of sticks, and lined with the inner bark of trees and fibrous roots."

The Menura equals a common pheasant in size, but its limbs are longer in proportion, and its feet much larger; the toes are armed with large arched blunt claws; the hind-toe is as long as are the fore-toes (the length of these being nearly equal), but its claw is larger than that of any of the others; the scales of the tarsi and toes are large bold plates, and their colour is glossy black; the head is small, the beak, as Cuvier has described it, is triangular at the base, pointed and compressed at the tip; in the male the feathers of the head are elongated into a crest: the wings are short, concave, and rounded, and the quill-feathers are lax and feeble; the general plumage is full, deep, soft, and downy. The tail is modified into a beautiful long plume-like ornament, representing, when erect and expanded, the figure of a lyre, whence the name of lyre-bird. This ornamental tail is, however, confined to the male. In the female the tail is long and graduated, and the feathers are perfectly webbed on both sides of the shaft, although their texture is soft and flowing. In the male the tail consists of sixteen feathers; of these (see Fig. 1481) the outer one on each side is broadly but loosely webbed within, its outer web being narrow; as it proceeds it curves outwards, bends in, and again turns boldly outwards and downwards, both together resembling the framework of an ancient lyre, of which the intermediate feathers are the strings; these feathers, except the two central, which are truly but narrowly webbed on the outer side, consist each of a slender shaft, with long filamentous barbules, at a distance from each other, and spring out alternately. The appearance of these feathers, the length of which is about two feet, is peculiarly graceful; their colour is umber-brown, but the two outer tail-feathers are grey tipped with black, edged with rufous, and transversely marked on the inner web with transparent triangular bars. The general plumage of the Menura is umber-brown above, tinged with olive, and merging into rufous on the wings, and also on the throat. The under parts are ashy grey.

Family FRINGILLIDÆ (FINCHES).

The Finches compose a very numerous assemblage of conirostral birds, which may be subdivided into various minor groups, as Larks, Buntings, Linnets, Sparrows, Grosbeaks, Weaver-Birds, &c.; each group consisting of several genera, more or less immediately related to each other. None of the Fringillidæ are of large size. They tenant fields, groves, hedge-rows, and woodlands; and many are noted for their powers of song: hence they are often called hard-billed warblers, in contradistinction to the Sylviadæ, which, from the slenderness of their beaks, are sometimes, though not very correctly, termed soft-billed warblers.

Varying in length and strength, the beaks of the Fringillidæ are all more or less conical, and are well adapted for a harder diet than that of the Sylviadæ generally: unless when nestlings, insects in fact form only part of their food, grain of various kinds, as wheat, oats, rice, together with the seeds of plants, as of the thistle, the broom, the pea, &c., constituting their chief support; from this circumstance, and their general hardiness, few or none of our British Fringillidæ are migratory, though they are so in more northern latitudes, and it is well known how in severe winters our flocks of native larks are increased in numbers by multitudinous arrivals from the north. It is in the winter that the siskin and redpole seek a temporary retreat in our island. Most of the Fringillidæ associate in flocks during the winter, assiduously searching for food, and sometimes joined by others of a different species.

1450 (e).—The Skylark

(*Alauda arvensis*) Alouette des Champs, Temminck; Feld Lerche, Bechstein. This delightful songster is spread generally over Europe, several parts of Asia, and the north of Africa. Its favourite localities are extensive arable lands and open meadows, but, according to Mr. Thompson, in Ireland the wild mountain pasture is equally its abode. Occasionally the lark sings while resting on a clod of earth, but generally while in the air: rising spirally on quivering wings, it trills forth its animated and varied lay, mounting higher and higher, till it seems a mere speck in the clear blue sky. Its descent is oblique, and at first gradual, till within twenty of thirty yards of the ground, when ceasing its strain, it sweeps down suddenly to join its mate. The lark breeds in April or early in May, constructing a nest of vegetable stalks and dried grasses, lined with fine fibres, upon the ground, amongst corn or other herbage: the eggs are of a greenish-white spotted with brown: two broods are reared annually, the latter in July or August. The ordinary flight of the lark is easy and undulating, and on the ground it trips along with great facility, its feet, and especially the elongated slender hind-claw, expressly adapting it for the grassy surface of the field. Its food consists of insects, worms, grain and other seeds, the leaves of the clover, &c.

On the approach of winter, larks begin to collect in immense flocks, increased as the severity of the weather sets in by foreign arrivals: they frequent stubble-fields, turnip-fields, and similar situations, and being accounted a delicacy for the table, multitudes are captured at this season by means of nets and sent to the London market. Great numbers are taken in the neighbourhood of Dunstable, and more are imported from Holland.

The lark is too well known to need a minute description. With respect to the genus Alauda, we may observe that it is characterized by a subconical beak and an elongated and nearly straight hinder claw. (Fig. 1482, the egg of the lark.)

1450 (*b*).—The Woodlark

(***Alauda arborea***). Le Lulu, l'Alouette des Bois, or le Cujelier of the French, Baumlerche or Waldlerche of the Germans. This species is found over every part of Europe, as high northwards as Sweden, in the colder countries it is migratory, but not in the more temperate. In our island it is most abundant in the midland and southern districts, frequenting well-cultivated and woody scenery, its song is very sweet, though less thrilling and varied than that of the skylark. It is generally uttered on the wing, and is often continued for an hour without intermission, the bird describing all the time a series of widely extended circles. Sometimes it pours out its strains while perched on the branch of a decayed tree. It breeds in April: its nest, placed under the shelter of a low shrub or tuft of herbage, is formed of dried stalks and grass, lined with fibres and hair; the eggs are of a pale wood-brown marked with blotches of grey and dark brown. The wood lark does not associate in flocks during the winter, like the skylark, but merely in small families of five or seven individuals, which separate on the approach of spring or soon after Christmas, when, if the weather be mild, the males begin to utter their song. The woodlark needs no detailed description.

1483 (*a*).—The Common Bunting

(***Emberiza miliaria***). Bruant proyer, Temminck, der Grauammer, Bechstein. In the genus Emberiza the bill is conical, hard, sharp-pointed, and compressed at the tip, the roof of the upper mandible is furnished with a hard-rounded protuberance. The Common Bunting is spread over the greater portion of Europe, and is abundant in our island, especially in the arable districts, collecting in large flocks in the autumn, which frequent hedges, barn-yards, and the precincts of farm-houses: and their flesh being esteemed, they are often shot or netted in considerable numbers. In the spring they separate, and dispersing themselves through the country in pairs, breed in corn-fields, or in ditch-banks run wild with briars and brambles, making the nest, which is placed near the ground, of dried grasses lined with fibres and hair, the eggs are of a pale-greyish yellow tint, with spots and veins of reddish brown. During the spring, and while the female is engaged in the task of incubation, the male may be often seen perched conspicuously on the highest twig of a tall hedge, uttering a succession of singular and irregular notes. Grain is the favourite food of this species, whence it is often termed Corn-Bunting. This bird is too well known to need a description.

1483 (*b, c*).—The Yellow-Hammer (Male and Female)

(***Emberiza citrinella***). Bruant jaune, Temminck; Goldammer, Bechstein. Few of our native birds are more delicately and beautifully coloured than the Yellow-Hammer or Yellow-Bunting, but being very abundant it is less noticed, excepting as an intruder with other granivorous birds into the stack-yard, than it deserves. During the winter it collects in small flocks, or associates with flocks of the common bunting; and pairs in spring, during which season the male may be often observed on the top-most twig of a hedge-row uttering a monotonous chirp; if approached, it flies off, keeping along the hedge, and settles at a little distance: if followed, it repeats its flight again and again.

The yellow-hammer builds on the ground, in low bushes, in beds of nettles or other herbage, and its nest is formed of dried grasses with a lining of hair; the eggs are of a pale purplish white, with streaks and waving marks of chocolate colour. This species is to be met with throughout the greater part of Europe. Fig. 1484 represents its nest.

1483 (*d*).—The Reed-Bunting

(***Emberiza schœniclus***); Reed Sparrow; Black-headed Bunting. Le Coqueluche, Buffon; Bruant de Roseau, Temminck; der Rohrammer, Bechstein.

Wherever marshy spots and swamps, abounding with weeds, willows, and aquatic herbage, offer a suitable abode, from Italy to Sweden, and in the British Islands, the reed-bunting will be found, inhabiting the same places as the reed-warblers (Salicaria). Its nest and those of the latter birds have been often confounded, but the reed-bunting never suspends its nest between the stems of reeds, although it frequents them; on the contrary, it is built in a low bush or tuft of grass. we have seen it under the covert of rushes and in young ozier-beds: it consists of dried grass and moss lined with hair. The eggs are pale pinky-grey, spotted and veined with reddish brown. The reed-bunting has no song, but that of the sedge-warbler has been by some authors attributed to it—a mistake first corrected by Montagu, and which arose from the two species frequenting the same localities. The food of this species of bunting consists of the seeds of reeds and other aquatic plants, insects and their larvæ, in severe winters it seeks the farmyard as a place of supply and shelter. In Holland it is very abundant. The general colour of this bird is pale brown, the male having the head, throat, and centre of the chest black, a patch of white, beginning below the angle of the bill, spreads round the neck, and extends down the sides of the breast and over the under surface: quills brown, rump bluish grey.

1485.—The Ortolan

(***Emberiza hortulana***). L'Ortolan, Buffon, Ortolano of the Italians, Garten-ammer of the Germans. The native districts of this bird may be regarded as the southern provinces of Europe, it is common in Tuscany and some parts of France, and occasionally it is found as far north as Holland and Sweden. Several instances of its having been killed in England are recorded by Selby and other writers. It is the Emberiza Tunstalli of Latham, the green-headed Bunting of Brown and of Bewick, supposititious species founded on specimens captured in our island. It would appear that North Africa is the winter residence of the ortolan, and on its passage it visits Gibraltar every spring and autumn. Mr. Strickland saw it at Smyrna in April, and Colonel Sykes enumerates it among the birds of the Dukhun (in India). Millet and other grains, with insects in spring, constitute its diet. It builds on the ground in corn-fields, or in the covert of hedges or bushes, constructing a nest of fibres and leaves, lined with fine grass and hair. The eggs are reddish grey streaked with brown, or bluish white spotted with black. Its manners much resemble those of the yellow-hammer.

When properly fed for which purpose there are large establishments in the south of Europe, where they are placed after having been trapped and furnished with plenty of millet-seed and other grain, these birds become very fat and are delicious. In the male, the throat, the circle round the eyes, and a narrow band springing from the angle of the bill, are yellow, these two yellow spaces being separated by a blackish grey dash: head and neck grey, tinged with olive, and spotted with brown, feathers of the upper parts blackish in the middle and reddish on their edges, under parts reddish bay, tail blackish, the external feather with white on the outer vanes: bill and legs flesh-colour. Length six inches and a quarter. The female is smaller, and less decidedly and brightly coloured.

1486.—The Scarlet Tanager

(***Tanagra rubra***, Wilson); Pyranga rubra, Vieillot. The Tanagers are characterized by a conical bill, triangular at its base, slightly arched along the ridge, and notched towards the end. The wings are short, the colours brilliant. Country, America.

The Scarlet Tanager, or Summer Red-bird, is one of the most beautiful of its race; the male in full plumage being scarlet-red, with the wings and tail black. The female, and the male in autumn, are dull green, inclining to yellow, with the wings and tail dusky: length about six inches and a half. It is in August that the male moults and exchanges his scarlet for the greenish-yellow dress. "This splendid and transient resident," says Nuttall, "accompanying fine weather in all its wanderings, arrives from his winter station in tropical America from the beginning to the middle of May, and extends his migrations probably to Nova Scotia as well as Canada. With the shy, unsocial, and suspicious habits of his gaudy fraternity, he takes up his abode in the deepest recesses of the forest, where, timidly flitting from observation, he darts from tree to tree like a flashing meteor. A gaudy sylph, conscious of his brilliance, and the exposure to which it subjects him, he seems to avoid remark, and is only solicitous to be known to his humble mate, and hid from all beside. He therefore rarely approaches the habitations of men, unless perhaps the skirts of the orchard, where he sometimes, however, builds his nest, and takes a taste of the early and inviting, though forbidden, cherries. Among the thick foliage of the tree in which he seeks support and shelter, from the lofty branches, at times, we hear his almost monotonous *tship-witee*, *tship-idee*, or *tshukadee*, *tshukadee*, repeated at short intervals, and in a pensive under-tone, heightened by the solitude in which he delights to dwell. The same note is also uttered by the female when the retreat of herself and young is approached; and the male occasionally utters, in recognition to his mate, as they perambulate the branches, a low whispering '*tant*, in a tone of caution and tenderness. But besides these calls on the female, he has also, during the period of his incubation, and for a considerable time after, a more musical strain, resembling somewhat, in the mellowness of its tones, the song of the piping baltimore. The syllables to which I have hearkened appear like '*tshoove* '*wait* '*wait*, '*vehowit wait*, and '*wait*, '*vehowit vea wait*, with other additions of harmony, for which no words are adequate. This pleasing and highly musical meandering ditty is delivered for hours, in a contemplative mood, in the same tree with his busy consort. If surprised, they flit together, but soon return to their favourite station in the spreading boughs of the shady oak or hickory. This song has some resemblance to that of the red-eyed vireo in its compass and strain, though much superior, the '*wait* '*wait* being whistled very sweetly in several tones, and with emphasis, so that, upon the whole, our Pyranga may be considered as duly entitled to various excellences, being harmless to the farmer, brilliant in plumage, and harmonious in voice."

The same author describes the nest (which is built about the middle of May, on the horizontal branch of some shady forest-tree, commonly an oak, but sometimes in an orchard-tree) as but slightly put together, and usually framed of broken rigid stalks of dry weeds or slender fir-twigs, loosely interlaced and partly tied with narrow strips of Indian hemp (Apocynum), some slender grass-leaves, and pea-vine runners (Amphicarpa), or other frail materials, the interior being sometimes lined with the slender, wiry, brown stalks of the Canadian cistus (Helianthemum), or with slender pine leaves, the whole so thinly platted as to admit the light through the interstices. The three or four eggs are dull blue, spotted with two or three shades of brown or purple, most numerous towards the larger end. As soon as their single brood, which is fledged early in July, is reared, they leave for the south, generally about the middle or the end of August."

"The female," says this interesting author in continuation, "shows great solicitude for the safety of her only brood, and, on an approach to the nest, appears to be in great distress and apprehension. When they are released from her more immediate protection, the male, at first cautious and distant, now attends and feeds them with activity, being altogether indifferent to that concealment which his gaudy dress seems to require from his natural enemies. So attached to his now interesting brood is the Scarlet Tanager, that he has been known, at all hazards, to follow for half a mile one of his young, submitting to feed it attentively through the bars of a cage, and, with a devotion which despair could not damp, roost by it in the branches of the same tree with its prison."

The food of this species consists mostly of winged insects, such as wasps, hornets, and wild bees, the smaller kind of beetle, and other Coleoptera. Seeds are supposed to be sometimes resorted to, and they are very fond of whortle and other berries.

1487.—The Snow-Bird

(***Struthus hiemalis***, Bonaparte). Fringilla hiemalis, Linnæus.

This species, which is a true finch, must not be confounded with the Snow Bunting (Plectrophanes nivalis) of the artic regions of the old and new world, of which it is also a native, migrating in flocks southwards on the approach of winter. In America, they spread at this season over the United States to the shores of Mexico. About the 20th of October, says Wilson, "they make their first appearance in those parts of Pennsylvania east of the Alleghany

1493.—Nest of House-Sparrow.

1497.—Arabian Bullfinches

1496.—Nest of Bullfinch.

1494.—Nest of Chaffinch.

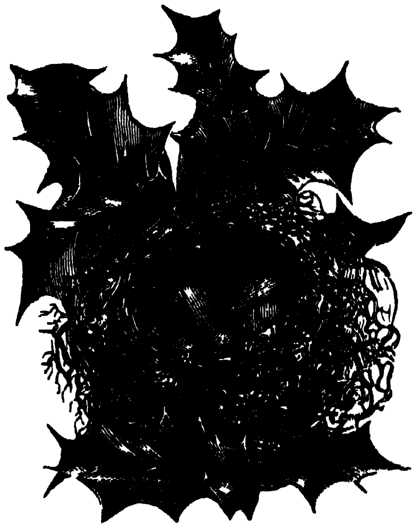
1490.—Group of Finches.

1491.—Nest of Goldfinch.

1502 —Pannicle of the Rice plant.

1500.—Whidah Birds.

1498 Thick billed Bullfinches.



1503 —Nest of Greenfinch

1499.—Blue Bullfinch.

1495 —Bullfinch.

1505.—Crossbills.

Mountains. At first they are most generally seen on the borders of woods, among the falling and decayed leaves, in loose flocks of 30 or 40 together, always taking to the trees when disturbed. As the weather sets in colder, they approach nearer the farmhouses and villages, assembling in larger flocks, and doubly diligent in searching for food. When deep snow covers the ground, they become almost half domesticated. They collect about the barns, stables, and other outhouses, and even round the steps of the door, not only in the country and villages, but in towns, crowding around the threshold early in the morning, gleaning up the crumbs, and appearing lively and familiar." They retire northwards in April; breeding in the high latitudes, and making a nest on the ground. The snow-bird is about six inches long; the general colour is slate grey, deeper and purer in winter: the lower part of the breast, the under parts, the edges of the primaries, and the two outer tail-feathers being white. Audubon states that in fine weather these birds roost in the evergreen foliage of the holly, the cedar, and the pine; but in cold weather, in holes in stacks and other snug retreats. They are accounted delicacies for the table.

Cuvier says that this species occurs in the highest region of the Alps, descending to the lower mountains only during the severity of the winter. It occurs in Norway, Sweden, and other northern districts of Europe; but has never, we believe, been seen in our island.

1488, 1489 (*e, f*).—The Siskin, or Aberdevine

(*Carduelis spinus*). Le Tarin, Buffon. Norway, Sweden, and the North of Germany are the native regions of this pretty little bird, whence in severe winters it migrates southwards, occasionally visiting our islands in immense flocks, which resort to birch and pine woods, and alders along the margin of streams, often in company with the lesser redpole.

Temminck informs us that this bird builds in the highest branches of the pine, and that its eggs are of a bluish white speckled with purplish red,

Though the siskin must be regarded rather as a winter visitor than a permanent resident in the British Islands, still there are not wanting examples of its breeding within our shores. Mr. Selby assures us that it is ascertained to breed in some of the pine-woods in the Highlands of Scotland. "Near Killin," he adds, "these birds were observed by Sir W. Jardine and myself to be in pairs in the month of June, inhabiting a wood of very old and lofty pines, but we were unable to procure the nests from the height and inaccessible nature of the trees. In captivity the siskin, judging by one which we kept for a length of time, soon becomes familiar; its song is a trifling though not unpleasing twitter; it is said to pair readily with the canary-finch; but in this particular our endeavours to procure a mule breed altogether failed.

The male in our possession was coloured as follows: Top of the head black; ear-coverts dusky; a line above the eye, sides of neck, throat, and chest, lemon-yellow; back and shoulders dark olive-green with obscure dusky dashes; quills brown, with an oblique yellow bar, and another above, produced by the yellow edging of the greater coverts. Flanks dusky with a few brown dashes; rump yellow, slightly washed with green; two middle tail-feathers dark brown; the rest yellow tipped with brown, the outermost having the external vane of this colour also. Bill and legs horn-colour. Length four inches and three quarters; tail short and forked.

The female is less brightly and decidedly marked.

1490.—The Canary Finch

(*Fringilla* [*Carduelis*] *Canaria*). Of this well-known songster, of which a caged breed has spread over Europe, we shall say nothing excepting that it is a native of the Canary Islands and Madoria, and, according to Bechstein, was first introduced into Europe in the beginning of the sixteenth century: Italy being the first country in which broods were reared. Its colour in a wild state is greenish grey, darker on the back, and olive-green on the chest.

1489 (*c, d*).—The Goldfinch

(*Carduelis elegans*). Le Chardonneret, Buffon; Distel Zeisig, Bechstein.

Among our native finches none exceeds the goldfinch in beauty and docility; hence it is frequently kept in cages, and taught to draw up a little bucket of water when thirsty, and other tricks, which neither good taste nor proper feeling would sanction. The song of this species is a twitter, soft and pleasing, but of no power.

In its natural state the goldfinch breeds in orchards, large gardens, plantations, &c., often selecting some dense evergreen as the site of its nest, which is an elegant piece of workmanship, being formed externally of moss, lichens, dry grass, and wool, and lined with hair and seed-down of the coltsfoot or the down of the willow. The eggs are of a bluish white, marked at the larger end with orange-brown spots

The food of this species consists of the seeds of various plants, among which we may mention those of the thistle, dandelion, groundsel, burdock, &c.

In winter it associates in small flocks of 10 or 12 in number, which flit about the hedges or old orchards in quest of food. The goldfinch is spread through Europe generally, and two allied species are natives of the Himalayan Mountains. Fig. 1421 represents the nest of the common goldfinch.

1489 (*a, b*).—The Common Linnet

(*Linaria cannabina*). Greater Redpole, Grey Linnet, Brown Linnet, of authors. La Linotte ordinaire, Buffon; Bluthan-fling, Bechstein.

Owing to the difference between the winter and summer plumage of this bird, naturalists have multiplied its synonyms, regarding it under the head of two distinct species—an error which was first pointed out by Montagu, whose opinion has been confirmed by Selby and other ornithologists. It would appear, from the observations of the latter author, that birds captured in full summer plumage with the top and breast of a fine carmine-red, after losing that dress at the period of the autumnal moult, never acquire it while caged, but retain their plain brown livery; this accounts for the assertion of some observers, that the grey linnet remains the same in its plumage at all seasons.

The linnet is found over Europe generally, and is common throughout the British Islands, extending as far as the Orkneys. The song is very sweet, whence it is often kept in cages, and sometimes paired with the hen canary. Rough commons and neglected pasture lands are its favourite localities, where various plants furnish it with food; it is very partial to the seed of the flax, thistle, dandelion and of cruciform plants.

The nest of the linnet is generally built in some low bush, the thick spiny furze being preferred; it is composed of moss, stalks of grass, and wool, lined with hair and feathers; the eggs are of a bluish white speckled with purplish red.

In the winter these birds congregate in large flocks, and visit the rocky shores of the sea, where they flit about active and industrious in the search of food, ever and anon uttering a lively call. In the spring they separate, and pair and revisit their upland haunts.

Allied to the common linnet are the Twite (Linaria montana), found in the hilly districts of our island and abundant in Norway and Sweden, and the lesser Redpole (Linaria minor), resident throughout the year in Scotland and the northern counties of England, but a winter visitor to the southern counties, together with many continental species.

1492.—The Song-Sparrow

(*Zonotrichia melodia*, Bonap.). Fringilla ferruginea, Linnæus; Fringilla melodia, Wilson.

The species is a representative of the song-finches of the United States of America, and is partially migratory, moving southwards in the month of November: though many individuals remain behind the great body, and continue permanent in their old quarters.

"This finch," says Wilson, "is the first singing bird in spring, and is heard during the whole summer and autumn; its notes are short, but very sweet, and are uttered generally from the branches of a bush or small tree, where it will sit singing for an hour together. It frequents the borders of rivers swamps, and marshy places, and when wounded and unable to fly will readily take to the water and swim with considerable rapidity. In winter it haunts in multitudes the great cypress swamps of the southern states, associating with other species. This bird builds its nest on the ground among the roots of tall grasses, and also, strange to say, in cedar trees five or six feet from the ground. The eggs are white or bluish white, thickly speckled with reddish brown."

The male and female closely resemble each other in colouring. Upper part of the head reddish brown mottled with dark brown, with a broad line of bluish grey down the middle; back grey streaked with reddish brown and dusky; rump bluish grey, as also the sides of the head; a broad line of brown from the eye backwards, and another from the angle of the mouth. Under parts white, tinged on the sides with grey, and posteriorly with reddish brown: neck and breast spotted with dark brown; wings and tail brown. Length six inches.

The circumstance of this bird choosing two different localities for the site of its nest calls to our mind the nidification of our common house-sparrow (Pyrgita domestica). This bird builds in the niches of masonry; in the fissures and crevices of walls, barns, or houses; in ivy or other foliage against the side of a house, and also in trees. The nest consists of hay, straw, feathers, and other materials, and in snug crevices and under the eaves of houses it loosely put together, its shape varying according to that of the site, but it is usually domed; in trees it is large, firmly constructed of well-intertwined materials, and completely domed, with a lateral aperture, and lined with feathers and other soft materials. It is, however, a shapeless and inartificial structure, destitute of that trimness and compactness so remarkable in the nests of our finches generally, as the goldfinch and the chaffinch. A specimen of the nest of the house-sparrow in a tree is represented at Fig. 1493.

1494.—The Nest of the Chaffinch

(*Fringilla cœlebs*). This is a most artful and beautiful structure, composed externally of moss, fine wool, lichen, the scales of bark, and often spiders'-webs, all neatly felted together, and presenting a smooth and carefully-finished exterior; internally it is delicately lined with wool and hairs. It is securely attached to the supporting stems by bands of moss, felted with wool, which are twined round them and worked into the mass of materials composing the nest. The elm, oak, hawthorn, and thick tall bushes are generally selected. We have seen the nest in a dense holly, and also on old apple-trees overgrown with moss and lichens; sometimes it is shrouded among the luxuriant ivy encircling the trunks of elms or other trees. The eggs are bluish white, tinged with pink, and marked with streaks of purplish red. The chaffinch is too well known to need a minute description.

1495.—The Bullfinch

(*Pyrrhula vulgaris*). Bouvreuil of the French; Fringuello morino, Ciufolotto, Suffuleno, Monachino, of the Italians; Dom-pape of the Danes and Norwegians; Dom-herre of the 'Fauna Suecica;' Bulfinck, Rothbrustiger Gimpel, and der Gimpel of the Germans; de Goudvink of the Netherlanders; y Chwybanydd and Rhawn-goch of the ancient British.

In the Bulfinches the bill is short, hard, conico-convex, thick, swollen at the sides, compressed at the point, with the ridge of the upper mandible advancing on the forehead, and arched. Tarsi short.

The common bulfinch is a native of the northern parts of Europe, and is only known in the more southern provinces as a bird of passage; in our island it is stationary. In the mountain forests of Germany it is very common.

This beautiful bird tenants the wooded districts, and is retiring in its habits; during the winter it associates in families of five or six individuals, the brood of the year, which separate in spring; when they pair, and commence nidification.

The native song of this bird is low, soft, and pleasing, but inaudible at a short distance; it has, however, the imitative faculty in great perfection, and can be taught to whistle musical airs with great accuracy. In Germany considerable attention is paid to the instruction of these birds, which require nine months of continued and regular teaching before they can execute an air with firmness and precision; which should be delivered in a flute-like tone. Birds well instructed sell at a high price, and are as interesting from their docility and affectionate disposition as from their voice, The common call-note of the wild bullfinch is a plaintive whistle.

Its food during summer and autumn consists of various seeds, but in the winter and spring it subsists chiefly on the buds of various trees and shrubs, as the thorn, larch, birch, the plum and other fruit trees, and is frequently from this cause very injurious in gardens; the buds are not swallowed whole, but minced to pieces by the edges of the powerful mandibles of the bill.

The bullfinch builds in low thick bushes or underwood, or on the flat foliage of a spruce pine or silver fir. It consists of a foundation of birch-twigs or other slender sticks, upon which is intertwined a basket of flexible fibrous roots, the whole forming a shallow nest. The eggs, four or five in number, are of a bluish white spotted with pale orange-brown. Fig. 1496 is the nest of this species. Caged birds often become quite black, an effect resulting from their being fed too profusely with hemp-seed. We knew a black bullfinch, which, on its spring moult, recovered its natural dress.

The male bullfinch has the head, wings and tail velvet black, with a tinge of purple; the back of the neck, and back, fine bluish grey: rump white; cheeks, throat, chest and sides, roseate; the greater wing-coverts margined with pinkish white. The female is much duller in plumage, and the chest has only a faint tinge of the roseate hue. An allied species (P. erythrocephala) is a native of the Himalaya Mountains.

1497.—The Arabian Bullfinch

(*Pyrrhula Synoica*). This species was found by Mr. Hemprich near Mount Sinai in Arabia; and appears also to extend into Egypt. It was one of the discoveries of the travellers sent some time since by the King of Prussia into that country with a view of obtaining specimens of natural history.

The male is ornamented round the base of the bill with a circle of rich red, going off in spots upon the cheeks. The front is covered with small silvery white feathers, slightly edged with red; the rump and all the lower parts fine rose-colour; upper parts ash-coloured, lightly tinged with rose; wings and tail brown.

The female is of a light brown colour above, each feather having a deeper-coloured centre. The lower parts pale tawny brown, with streaks of a darker tint. Length, about five inches and a half.

Of the manners and habits of this species we have no detailed account.

1498.—The Thick-billed Bullfinch

(*Pyrrhula Gigathinca*). This species is a native of Egypt and Nubia, and most probably other parts of Northern Africa. It is characterised by a very thick bill, and a slightly notched tail The colours of the sexes do not vary greatly. In the male a greyish colour tinted with bright rose covers all the lower parts of the body, the throat and the circle round the bill; this tint is palest on the throat. The crown of the head is pure ash-colour, and an ashy brown is spread over the nape, the buck, and the wing coverts. A faint rose-colour tinges the plumage of the rump and the edges of the quills and tail-feathers, all of which are bordered towards the end with whitish upon a black ground. The two middle quills are the shortest. The wings reach to the extremity of the tail-feathers; and the bill is of a fine red. Length, four inches six lines.

The female has no rosy tint except on the edges of the quills and tail-feathers, and on the rump, where it is very faint. The upper parts are of an Isabella brown, and the wings edged with a brighter tint of the same. The circle round the bill and the throat are ash-coloured; the lower parts of a pure Isabella-colour; and the middle of the belly white. Bill same as in the male.

1499.—The Blue Bullfinch

(*Pyrrhula cinerea*). This species is one of the American representatives of the present form, and is a native of Brazil, where it is not uncommon. The head, cheeks, back, and scapulars are ashy-bluish; wings and tail darker, but all the feathers of those parts are bordered with ash-colour. There is a small white spot on the wing, formed by the white towards the base of the quills, beginning with the fourth; the three first have no white. All the lower parts are white with the exception of the flanks, which are clouded with ash-colour. Bill coral-red, very strong, large, and as it were swollen (bombe). Feet ash-coloured. Length four inches and a half.

1500 (*a*).—The Paradise Whidah-Bird

(*Vidua Paradisea*, Cuv.). These birds, also termed Widow-birds, les Veuves of the French, constitute a small but interesting group of the finches, remarkable for the development of long caudal plumes in the males, characteristic of the breeding season, and subsequently lost. With respect to the name Widow (Veuve, Vidua), the author of the 'Gardens and Menagerie Delineated' informs us that "Edwards, the first modern writer by whom this interesting bird (the present species) was figured and described, having happened to say that the Portuguese called it the Widow from its colour and long train; Brisson took the hint, and gave it the name of Veuve in French, Vidua in Latin. The French naturalist had, however, overlooked the fact that Edwards had himself corrected the mistake, for such it was, in the following terms:—'In my description of this bird I have said that it is called the Widow by the Portuguese; but I am since better informed that it is called the Whidah-bird, because it is brought frequently to Lisbon from the kingdom of Whidah, on the coast of Africa.' The name thus accidentally given has now, however, been universally adopted both in popular and scientific language."

The present species is a native of Western Africa, from Senegal to Angola, and in all its habits is a true finch. "In captivity, which these birds endure without much appearance of constraint, they are lively and active, jumping from perch to perch, and alternately raising and depressing their long tails with great vivacity. They are usually fed upon grain, with the occasional addition of green herbs, and are fond of bathing in the water which is placed in their cage. Twice a year they are subject to changes of plumage, which alter the appearance of the male especially, to such an extent that it would be difficult to recognise in him the same bird. The long feathers which are his peculiar attribute fall off towards the end of autumn, and, with the other changes that take place in its plumage, leave him little to distinguish him during the winter months from his plainer mate. But in spring he recovers his long feathers, his more brilliant hues, and his sharp but agreeable and varied note: the change being usually completed by the beginning of June. It is said they live for twelve or fifteen years." The colour of the male in full plumage is of a bright black, with the exception of an orange rufous band round the neck, spreading over the chest, and gradually fading into dull white on the under parts. The tail is, as usual, composed of twelve feathers, of which the four middle are elongated and vertical: two being flowing and pendent, and two (the middle) broad, with a shaft projecting like a slender filament beyond the end. Size, that of a sparrow. After the autumnal moult the colours are rusty brown and white.

1500 (*b*).—The Red-billed Whidah-Bird

(*Vidua erythrorhyncha*). This species inhabits the same regions as the preceding, but is of less size. Of the four middle and greatly elongated tail-feathers two are convex, and two (one within the other) concave, so that when all four are closed they form a sort of cylinder, and but for their extremities appear at first sight as one.

The general colour of the male in full plumage is glossy blue-black, with a white collar and white wing-coverts and scapularies, of which hue are also the lower part of the back, the throat, the chest, and under parts. In habits it agrees with the other species.

1501.—The Java Sparrow

(*Fringilla oryzivora*). Rice-bird; Paddy-bird. Boorong Peepee of the Sumatrans; Glato of the Javanese.

This bird is well known, being so frequently brought over to this country from India and kept in aviaries and cages for the sake of its elegant figure and pleasing colours. In its native regions it is notorious for the ravages which it commits in the rice-fields, on which flocks descend, clearing the pannicles of the ripe grains, and leaving nothing but the empty husks. (See Fig. 1502: *a*, a pannicle of the rice plant with ripe grains; *b*, a single grain enveloped in its husk, and awned.)

The colour of the Java sparrow is a delicate leaden grey, with a sort of bloom over the whole plumage, like that visible on plums; the bill is red; the head and tail black, the under parts with a slight roseate tinge; in the male the cheeks are snowy white; legs flesh-coloured: the size of the beak is remarkable.

1503.—The Greenfinch

(*Coccothraustes chloris*), Nest of. Our pictorial specimen of the nest of this common bird, which is spread over the greater part of Europe, is represented as shrouded by the foliage of the holly. It consists externally of a rough basket-work of roots interwoven with moss loosely put together, but increasing in compactness as the structure advances: and when a layer of finer roots has been worked as a middle wall, a thick compact texture of hair is added as a lining. The eggs are four or five in number, of a bluish white, speckled at the larger end with light orange-brown.

1504.—The Hawfinch

(*Coccothraustes vulgaris*). In the genus Coccothraustes the bill is very stout at the base, whence it tapers rapidly to a point, the lower mandible being nearly as thick as the upper; the wings are long, the tail short, the tarsi short. The present species is the Haw Grosbeak and Grosbeak of the modern British; Gylfinbraff of the ancient British; le Grosbek and Pinson Royal of the French; Frogione, Froccione, Frosone, Frisone, Friggione, of the Italians; Kernbeisser, Kirsch Kernbeisser, Kerschfink, Nusbeisser of the Germans; Appelvink of the Netherlanders; Loxia Coccothraustes of Linnæus; Fringilla Coccothraustes of Temminck; Coccothraustes vulgaris of Brisson.

The Hawfinch is plentiful in some districts of France; permanent and not uncommon in Italy; common in Germany, Sweden, and part of Russia. In Mr. Selby's 'Illustrations,' and indeed in most other English works, the hawfinch is noticed as an occasional visitant. Dr. Latham says that "the hawfinch visits us chiefly in winter, but one was shot in the summer months near Dartford in Kent." He goes on to remark that White records another instance at the same season, and says that it had the kernels of damsons in its stomach. "These," continues Dr. Latham, "might possibly have bred here, though we have no authority for its ever being the case." This authority now exists in the observations of Mr. Doubleday. "The hawfinch," says Mr. Doubleday, "is not migratory, but remains with us during the whole of the year." This observer sufficiently accounts for the rarity of its appearance —"Its shy and retiring habits leading it to choose the most secluded places of the thickest and more remote parts of woods, and when disturbed it invariably perches on the tallest tree of the neighbourhood."

Hard seeds and kernels form the principal food of the hawfinch, but it feeds also on the berries of the hawthorn (whence its name); so that it is probable that the soft part of fruits is not disagreeable to it, although the bill is evidently formed for cracking the stony kernel. Willughby states that it breaks the stones of cherries and even of olives with expedition. The stomach of one which he dissected in the month of December was full of the stones of holly-berries. The majority of ornithologists give the hawfinch credit for forming a nest beautifully constructed of lichens and vegetable fibres, with a lining of feathers and other soft materials. But according to Mr. Doubleday, who has thrown much light on the history of this bird, and discovered it breeding in Epping Forest in May and June, the nest, which is made in some instances in bushy trees at the height of five or six feet, and in others near the top of firs at an elevation of twenty or thirty feet, is remarkably shallow and carelessly put together, being scarcely deeper than that of the dove. In materials it resembles that of the bullfinch, but is not to be compared with it in neatness and compactness of construction. Eggs, from four to six in number, of a pale greenish white, varying in intensity, spotted and streaked with greenish grey and brown. Mr. Gould states that he has known the bird to breed near Windsor, and a few other places; but certainly nowhere so abundantly as on the estate of W. Wells, Esq., at Redleaf, near Penshurst, Kent. This gentleman informed Mr. Gould that he had, with the aid of a small telescope, counted at one time eighteen on his lawn.

Mr. Selby remarks that in the pairing season it probably utters a superior song, as Montagu says that even in winter, during mild weather, he has heard it sing sweetly in low and plaintive notes.

The colours of the plumage are as follows:—rump, head and cheeks red-brown; edging round the bill, space between that and the eye, a line beyond the eye and throat, deep black; a large ash-coloured collar just below the nape; back and greater part of the wings deep brown, but there is an oblique white stripe upon the wing, and beyond it a considerable space of a light whitish colour going off into chestnut; secondary quills as if cut off square at the ends, or, as Edwards says, with justice, like the figures of some of the ancient battle-axes, glossed with rich blue, less conspicuous in the female; tail feathers white within, of a blackish brown on the external barbs; lower parts of the bird vinous red; iris pale red (according to Temminck); feet and bill greyish brown. Length seven inches.

The female resembles the male, but the colours are much less brilliant.

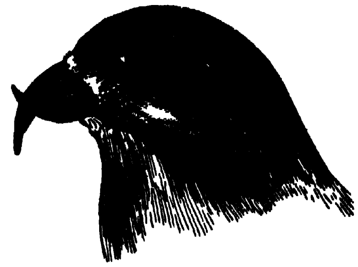
1505, 1506.—The Crossbill

(*Loxia curvirostra*). In the genus Loxia we find the beak compressed and elongated, with the mandibles bent in contrary directions, so that their points cross each other (see Head of Crossbill, Fig. 1507), while the tongue is furnished at its top with a horny scoop. The tarsi are short and the feet are formed for grasping tightly, as the birds cling in various positions to the twigs while procuring food. The use of this singular bill will be easily deduced from the following observations:—The seed of the cones of the pine is the principal food of the crossbill, and to obtain this the bird fixes itself across the cone, and then brings the point of each mandible together; and in this position it is enabled to insert them under the scales of the cone; this done, the beak is opened, not in the usual way, but by the lower mandible being drawn sideways (a peculiar arrangement of muscles effecting the action), and the scale is consequently raised up, the tongue is at the same time brought forward, and its scoop directed beneath the seed, which is dislodged and carried to the mouth. At Fig. 1508 is shown the skull of the crossbill dissected, so as to illustrate its structure, the arrangement of the muscles, and the peculiarity of the tongue:—A, Skull of crossbill, side view: *a*, temporal muscle; *b*, great pyramidal muscle. B, Head viewed from below: *b*, great pyramidal muscle; *c*, *c*, pterygoid muscles; *d*, *d*, graciles muscles. C, Head viewed from the side: *a*, pterygoid process; *b*, os omoideum; *c*, os quadratum; *d*, *d*, os jugale. D, Head viewed from behind: *a*, right temporal muscle; *b*, great pyramidal muscle. E, Lower jaw, side view: *a*, cavity for articulation; *b*, *b*, coronoid processes. F, Tongue seen from above: *a*, horny scoop; *b*, *b*, extensor muscles. G, Tongue, side view: *a*, horny scoop; *b*, extensor muscles; *c*, flexor muscle. (Yarrell, 'Zool. Journ.,' vol. iv.)

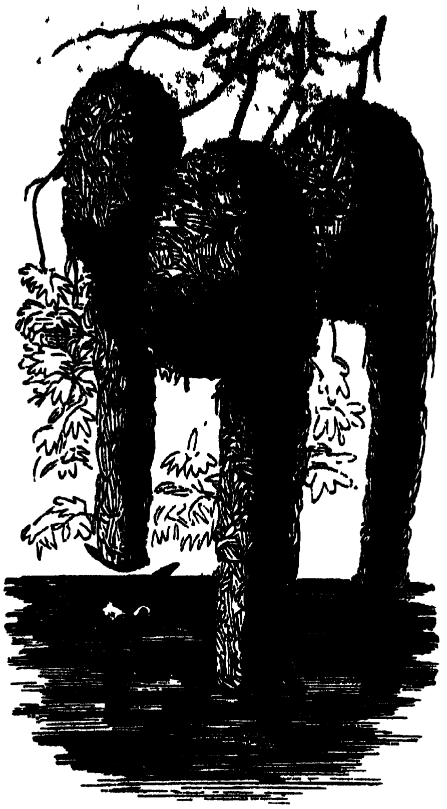
The common crossbill is the Becco incrocee, Crocione, and Crosiero of the Italians; Bec croisé of the French; Fichten Kreuzschnabel of the Germans; Kruisvink of the Netherlanders; Mindre Korsnab of the Scandinavians; and Gylfingroes of the ancient British. This species certainly breeds in the British Islands, and we may specify the Holt Forest in Surrey, and various fir or larch plantations

1511.—Sociable Weaver-Bird.

1504.—Hawfinch.

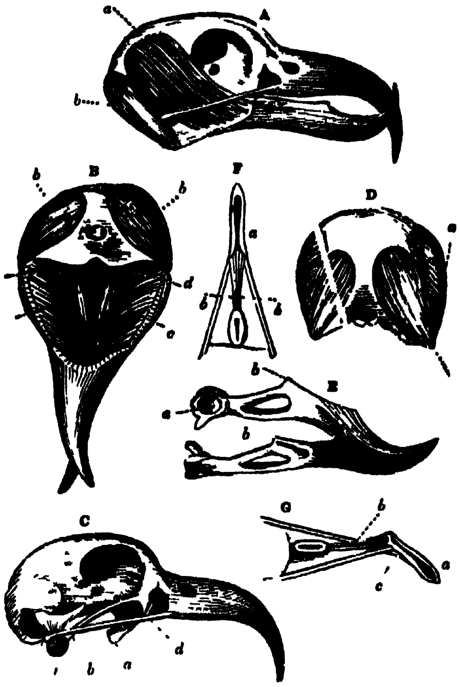


1507.—Head of Crossbill.



1509.—Nests of Pensile Weaver Birds.

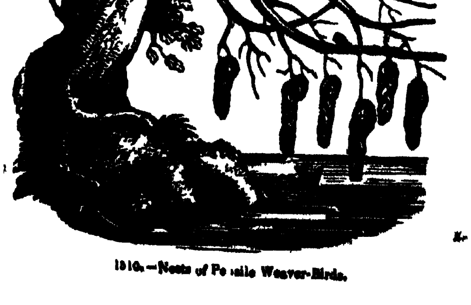
1506.—Crossbills.



1508.—Skull of Crossbill, dissected.

1514.—Nests of Sociable Weaver-Birds

1512.—Nests of Sociable Weaver-Birds.



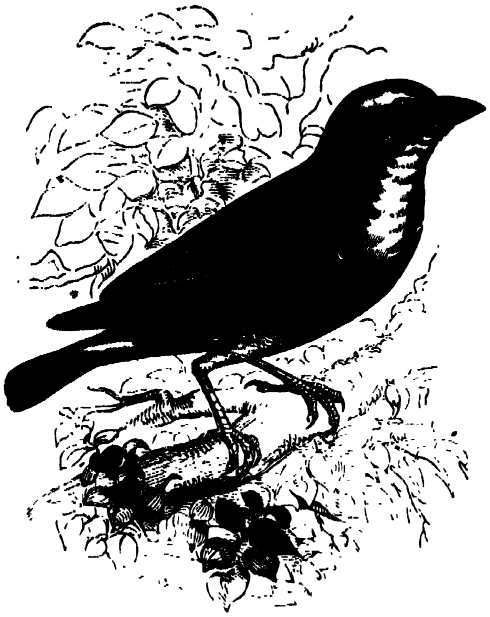
1510.—Nests of Pensile Weaver-Birds.

[illegible]—Nests of Soc[illegible]

1521.—Nest of Paya Sparrow.

1520.—Red-billed Weaver-Bird.

1522.—Nests of Sociable Weaver-Birds.



1518.—Mahali Weaver-Bird.

1517.—Taha Weaver-Birds.

1523.—Rice-Troopial.

1516.—Nests of Yellow-headed Weaver-Birds.

1515.—Yellow-crowned Weaver-Bird.

in Gloucestershire, as determined localities. (See 'Mag. Nat. Hist.,' May, 1830, p. 236, and June, 1830, pp. 310, 311, for interesting communications on the subject by Messrs. Brown and Long.) It appears that they breed in April, commencing their nest in March. This is placed on the topmost boughs of the fir or pine, and consists of slender twigs of fir, then a layer of coarse grass, lined with finer grass and a few long hairs. The eggs are of a slightly bluish-white, sparingly speckled with red. The male has an agreeable song. It is, however, in the vast pine-forests of Norway, Sweden, Germany, &c., that this crossbill is the most abundant. In those gloomy solitudes it finds a congenial residence and food in abundance. While at work upon the fir-cones, extricating the seeds, or while climbing in flocks of ten or twenty among the branches, using, like a parrot, their beaks and feet, these birds utter a continuous gentle twitter, different from the song of the male, which is poured out principally during the breeding season. At various times vast flocks from the Continent visit different parts of our island in the winter, evidently driven southwards by the severity of the season; they seek the shelter of fir-woods, and some perhaps remain altogether.

Besides the seeds of the fir, hemp-seed, and the seeds of apples are eagerly devoured, and they are said to divide with ease an apple in halves, in order to procure the kernels.* Crossed as their bill is, these birds can pick up the smallest seeds and shell or husk them; they can also open the shell of an almond, first picking a hole in it, and then inserting the bill and wrenching off pieces by the lateral motion of the under mandible. The following narrative of the habits of the crossbill in confinement is very interesting:—"My friend Mr. Morgan," says Mr. Yarrell, "kept a pair of these birds for some time, and had opportunities for observing their curious habits. They were impatient under confinement, and restless, climbing over the wires of their cages, by the use of their beak and claws, like parrots, One of their principal occupations was twisting out the ends of the wires of their prison, which they accomplished with equal ease and dexterity. A short, flat-headed nail that confined some strong net-work was a favourite object on which they tried their strength; and the male, who was usually pioneer in every new exploit, succeeded by long-continued efforts in drawing the nail out of the wood, though not without breaking off the point of his beak in the experiment. Their unceasing destruction of cages at length brought upon them sentence of banishment. During the period of their captivity a complete change took place in the colour of their plumage, without the shedding of a single feather."

The permanent colour of the plumage of this species is spotted olive-green, but the male of the year acquires in the autumn a general roseate tint.

Mr. Gould ('Birds of Europe') observes that in the minds of many naturalists some doubts still exist, and that they existed still recently in his own, a to whether the rich rosy-red colouring assumed by this bird is characteristic of the breeding season, or the permanent livery of the adult male. He states that during his recent visit to Vienna he had an opportunity of observing both sexes in every stage, an examination of which afforded him abundant proofs that the red plumage is acquired during the first autumn, for he saw many lately fledged that had their plumage thickly spotted; others that had partially lost their spotted appearance, and had partly assumed the red colouring; and others that had their feathers entirely tinted of this colour; while the adults, as most ornithologists have stated, were characterised by a plumage of olive-green, which appears to be permanent.

The same naturalist saw crossbills, swallows, martins, and various small birds exposed for sale in the markets, for the purpose of the table.

Besides the present species, the parrot-crossbill is found in Eastern Europe, and the white-winged crossbill occasionally occurs in the North; the latter, and a species nearly resembling the common crossbill (L. Americana,) are natives of North America.

Among the Fringillidæ is a singular group of birds, termed Weaver-birds, les Tisserins of the French (Ploceus, Cuvier), intermediate between the Finches and the Sturnidæ; and which construct the most singular and extraordinary nests, some pendent from the twigs of tall trees overhanging the water; others supported on the stronger branches, generally in clusters; some compacted together, so as to form one large dense mass of interwoven grasses. In these birds the bill is conical, and more or less elongated; the ridge of the upper mandible slightly bent, the tip without any notch; the claws are large: they are divided in various subgenera, but are all peculiar to the old world, Africa and India. It would appear that their mode of building their nests is, under the direction of instinct, designed to secure the young and eggs against the attacks of tree-snakes, which abound in the localities they occupy. Of these the Boomslange (Bucephalus Capensis) in Southern Africa is one of the most formidable.

1509, 1510.—Nests of the Pensile Weaver-Bird.

Barrow, in his 'Travels in Africa,' notices clusters of suspended nests, attached to slender twigs, fabricated by a species of Loxia, which unfortunately he neither names nor describes. These nests usually overhang a river or pool of water, and are shaped like a chemist's retort, with a body and long neck, at the end of which is the aperture, close over the surface of the water; the neck leads to a snug chamber, in which the young are reared; the structure is composed of interwoven grass. Though not capable of identifying the species, we suspect it to be the Nelicourvi, Loxia (Ploceus) pensilis of Sonnerat. We have seen nests of a similar form, constructed of wiry elastic grass, and attached to the leaves of palms, brought from Ceylon and the continent of India,—perhaps the work of the Ploceus (Euplectes) Philippensis. Colonel Sykes observes that this weaver-bird "is very common in Dukhun, and there are few wells overhung by a tree where their nests are not seen pendent; they live in small communities, and are very noisy in their labours." Pringle describes the South African nest as woven of a kind of tough grass, the cylindrical passage being twelve or fifteen inches in length; and twenty or more often hang from a single tree.

1511.—The Sociable Weaver-Bird

(*Ploceus socius*, Cuvier). Philæterus lepidus, Smith; Euplectes lepidus, Swainson; Loxia socia, Latham; Ploceus Patersonii, Lesson.

According to Dr. Smith, the banks of the Orange River constitute the southern limits of the range of this species, which was only obtained in great abundance in the districts around Latakoo far from water. The most striking peculiarity, adds Dr. Smith, "observed in this species is the extraordinary manner in which a number of individuals associate and build their nests under a common roof. When a nesting-place has been selected, and the operation of building is to be commenced *ab initio*, the community proceed conjointly to construct the general covering which interests them all: that being accomplished, each pair begin to form their own nest, which, like the roof, they construct of coarse grass; these are placed side by side against the under surface of the general covering, and by the time they are all completed the lower surface of the mass exhibits the appearance of an even horizontal surface, freely perforated by small circular openings. They never use the same nests a second time, though they continue for many years attached to the same roof. With the return of the breeding season fresh nests are formed upon the lower surface of those of the preceding year, which then form an addition to the general covering. In this manner they proceed year after year, till at last the weight often becomes such as to cause the destruction of its support, upon which a new building is commenced. They appear to prefer constructing these nests upon large and lofty trees; but where such do not occur, they will even condescend to form them upon the leaves of the Arborescent Aloe (*Aloe arborescens*), as occasionally happens towards the Orange River. The commencement of the roof is firmly interwoven with the branches of the trees to which it is intended to be suspended, and often a great part of the principal branch is actually included within its surface. Each female lays from three to four eggs, of a bluish-white colour, freely mottled towards the large end with small brown dots." Paterson and Le Vaillant give a somewhat similar account of these nests, some of which they saw of enormous size; the latter traveller mentions one which had three hundred and twenty inhabited cells, each cell being the property of a pair of birds. The grass used is a wiry kind, called Boschman's grass. Thus, then, do these weaver-birds found a republic, and cluster together under one roof their separate homesteads; the labour of each busy artificer contributing to the general good. Fig. 1512 shows the nests of this bird apparently just finished, or but little added to; while Figs. 1513 and 1514 represent a structure of long standing, with the additions of several years, and completely covering the branches. The general colour of the sociable weaver-bird is brown, varying in its shades; the feathers of the back edged with pale buff, which is the general tint of the under parts. Total length about five inches.

1515.—The Yellow-crowned Weaver-Bird

(*Ploceus spilonotus*). P. flaviceps, Swains.; P. stictonotus, A. Smith. This species, of which the male has the plumage varied with yellow and brown, is a native of the districts bordering on the south-east coast of Africa; but, according to Dr. Smith, is not found to the west of Caffreland. It is rare, and frequents the banks of rivers, suspending its nest, which is of a kidney shape and composed of closely interwoven grass, from the branch of a tree overhanging the water. The eggs are three or four, of a delicate greenish blue. The length of the bird is about seven inches.

1516.—The Yellow-headed Weaver-Bird

(*Ploceus icterocephalus*), Nests of. These kidney-shaped nests attached to long pendent twigs are the work of a South African Weaver-bird, closely allied to, if not identical with, the preceding. They are composed of strong interlaced grass, and lined with the heads or panicles of the same, forming a smooth, soft, and cool bed. The opening is lateral, near the top, the dome above protecting the inside from rain.

1517.—The Taha Weaver-Bird

(*Euplectes Taha*, Smith). According to its original describer, Dr. Smith, this species is a native of Africa, but does not extend its range south of 26°. In districts north of this degree it was common, and large flocks were often observed among the trees near the banks of rivers; but, according to information gained from the natives, the birds leave the trees at the commencement of the breeding-season for the reeds which skirt the rivers, and from which they suspend their nests. These and other allied species are very destructive to gardens and corn-lands, and the natives are obliged to watch the crops to prevent the grain from being devoured. The plumage of the male (upper figure) is mingled yellow, grey, and brownish-black; in winter yellowish-brown above, dashed with brownish-black; under parts greyish-white, tinged sienna yellow on the chest. The female (lower figure) resembles the male in his winter dress.

1518.—The Mahali Weaver-Bird

(*Pliopasser Mahali*, Smith). This bird was seen for the first time by Dr. Smith upon a tree on the bank of one of the tributaries to the Orange River; but he met with small and occasionally large flocks as far north as the tropic of Capricorn, the species being disposed to congregate. Twenty or thirty nests were to be seen on one tree. Insects and seeds are the food of this species, and in search of these the bird passes much time upon the ground. If disturbed while feeding, the whole flock take wing, and settle in a neighbouring tree, where they remain till they see the way clear for their return.

The nests, observes Dr. Smith, in figure and texture, had many of the characters of those of Ploceus, but resembled those of some of the South African Pyrgitæ (sparrows) in the manner in which they were armed. The walls of each nest were entirely composed of stalks of grass, the thickest ends of which were so placed as to protrude externally for several inches beyond the compact structure destined to contain the eggs. Thus each nest appeared armed with numerous projecting spines, and bore considerable resemblance to the body of a porcupine with its spines partially erected. The design is to oppose an obstacle to the advance of snakes towards the eggs and young. The plumage is varied with different tints of brown, and with white, the chest and under parts being cream-yellow; the throat and under tail-coverts white. Length six inches and a half.

Fig. 1519 represents the clustered nests of this species.

1520.—The Red-billed Weaver-Bird

(*Textor erythrorhynchus*, Smith). This species inhabits Southern Africa, north of the 25th degree of latitude; and, as Dr. Smith states, is never seen where herds of buffaloes are scarce. Whenever discovered, it was always in attendance upon these animals, flying over them or perched on their back, busily employed in collecting insects from the hide, and passing rapidly from one part to another, the huge beast paying no attention to its movements. Sometimes numbers of these birds were seen associated with the buffaloes, and sometimes only one or two. Their food consists of parasitic insects, at least in part, such having been found by Dr. Smith in the stomachs of those specimens which he examined.

This bird, besides being of service to its bulky associates by ridding them of the parasitic insects which infest their hides, performs for them another important service. On observing any unusual appearance, the attention of the bird is immediately directed to it, and if it sees anything to excite alarm, the bird flies up, whereupon all the buffaloes instantly raise their heads, and endeavour to discover the cause which led to the sudden departure of their sentinel. If their apprehension is confirmed, they take to flight in a body, accompanied by their winged and serviceable friends, which, as soon as the herd halts to feed, return to their avocation.

---

* A large flock of these birds, which visited the south of Ireland at the commencement of the present century, in the autumn, did much damage in the apple-orchards. In general, however, they seek the pine-woods.

Dr. Smith never observed this bird attaching itself to any quadruped but the buffalo, while two species of Buphaga visit the rhinoceros. The general colour of the Red-billed Weaver-bird is blackish-brown; the primaries are marked largely with white; bill yellowish red, with a purplish tinge on the sides.

1521.—Nest of Baya Sparrow, or Toddy-Bird.

"The Baya, or Bottle-nested Sparrow, is remarkable for its pendent nest, brilliant plumage, and uncommon sagacity. These birds are found in most parts of Hindostan; in shape they resemble the sparrow, as also in the brown feathers of the back and wings: they are of a bright yellow, and in the rays of a tropical sun have a splendid appearance when thousands are flying in the same grove. They make a chirping noise, but have no song they associate in large communities, and cover extensive clumps of Palmyras, acacias, and date-trees with their nests. These are formed in a very ingenious manner, by long grass woven together in the shape of a bottle, and suspended by the other end to the extremity of a flexible branch, the more effectually to secure the eggs and young brood from serpents, monkeys, squirrels, and birds of prey. The nests contain several apartments, appropriated to different purposes: in one the hen performs the office of incubation, another, consisting of a little vault covering a perch without a bottom, is occupied by the male, who with his chirping note cheers the female during her maternal duties." (Forbes, 'Orient. Mem.')

Fig. 1522 represents the nests of the Sociable Weaver-bird, previously described (from Le Vaillant)

Family STURNIDÆ (STARLINGS).

In this family the beak is elongated and conical, running to a sharp point from a stout base. In some genera the ridge of the upper mandible is carried up the forehead in others the beak is depressed at its extremity. The diet is of a mixed character Many species associate in flocks, and many build artful pendent nests like those of the weaver birds, to which group they in many respects closely approximate.

1523.—The Rice-Troopial

(*Dolichonyx orizivorus*, Swains) Bob-o-Link, Rice-bird, Reed-bird Rice-bunting of authors This is a well-known bird throughout the whole of North America, from the Saskatchewan river to Mexico, flocks arriving in March from their winter-quarters, the West India Islands, and scattering themselves over the savannahs and meadows, and newly-ploughed lands, feeding on insects and their larvæ, as well as on the tender wheat and early barley They associate in large flocks, the males uttering a rapid voluble strain in chorus, all simultaneously ceasing at the same instant.

About the middle of May these birds reach the state of New York, and pair and prepare their nests At this season the males pour forth their songs in the air, rising and falling in successive jerks The nest is placed amongst the grass, or in a field of wheat or barley, on the ground, and is composed of dry grasses and leaves, lined with finer materials, the eggs, five in number, are dull bluish-white, spotted with blackish

In July, when the young are reared, these rice-troopials assemble in incredible multitudes, and begin their devastations They plunder the fields of grain, they swarm about reed-beds, alighting in thousands, bearing down the stems with their weight, and feeding on the ripe seeds Their progress is towards the Southern States, and in September they appear in Carolina in countless numbers, spreading over the rice-fields and devouring the grain while yet soft and milky; thus they often ruin acres of this produce From the time of their congregating in July to September, the gun thins their numbers; thousands are killed for the markets, their flesh being exquisite. Towards the close of *October, before the rice-crop is gathered in*, the troops have made their appearance in Cuba and Jamaica, where they feed on the seeds of the Guinea-grass, and where the birds, being very fat, are in high esteem for the table.

The rice-troopial is subject to a double annual moult and change of colouring. The male in his spring dress has the head, fore part of the back, shoulders, wings, and tail, together with the whole of the under plumage, black, passing on the middle of the back into greyish; scapulars, rump, and upper tail-coverts white; back of the neck ochre-yellow. Bill bluish-black, but in the autumn pale flesh-colour, as in the female and young male. The feathers of the tail are sharp at the end, as in the woodpecker.

The female, whose plumage the adult male assumes after the breeding-season, has the back streaked with brownish black, and the whole of the under parts of a dirty yellow.

1524.—The Baltimore Oriole

(*Icterus Baltimorus*). In the genus Icterus the beak is long and conical, and a narrow slip of horn, from the upper mandible, runs up the forehead.

The Baltimore Oriole (Baltimore-bird, and Baltimore Starling) derives its name, as Catesby informs us, from its colours, which are brilliant orange and black, being those of the arms or livery of Lord Baltimore, formerly proprietor of Maryland

This species is a summer visitor to the United States, arriving from more southern regions (in which it passes the winter) about the beginning of May, and departing at the close of August Its range extends throughout North America, from Canada to Mexico, and, according to Wilson, it is even found as far south as Brazil. Not only does it frequent woods and trees surrounding farm-houses, but even ventures into towns and villages. "Since the streets of our cities," says Wilson, "have been planted with that beautiful and stately tree the Lombardy poplar, these birds are our constant visitors during the early part of the summer, and amid the noise and tumult of coaches, drays, and wheel-barrows, and the din of the multitude, they are heard chanting their native wood-notes wild." The strain is a clear mellow whistle, repeated at short intervals, and with a degree of wild plaintiveness in it, rendering it extremely interesting The ordinary call of this bird is a reiterated chirrup, which becomes louder, and is uttered in an angry tone whenever any enemy approaches, or upon the appearance of a cat or dog near its nest

Almost the whole genus of Orioles (Icterus), says Wilson, belong to America, and, with few exceptions, build pensile nests "Few of them, however, equal the Baltimore in the construction of these receptacles for their young, and in giving them such convenience, warmth, and security. For these purposes he generally fixes on the high bending extremities of the branches fastening long strings of hemp or flax round two forked twigs, corresponding with the intended width of the nest, with the same materials, mixed with quantities of loose tow, he interweaves or fabricates a strong firm kind of cloth, not unlike the substance of a hat in its raw state, forming it into a pouch of six or seven inches in depth, lining it substantially with various soft substances, well interwoven with the outward netting, and lastly finishes with a layer of horsehair, the whole being shaded from the sun and rain by a natural canopy of leaves' As much difference, adds Wilson, will be found in the style, neatness, and finishing of the nests of the Baltimores, as there is in their voices

Audubon describes the nest of one of these birds found in the state of Louisiana, as composed of the long filaments of a kind of moss known there by the name of Spanish-beard, and destitute of the warm lining with which, had the individual built in Pennsylvania or New York, it would have been furnished, but in Louisiana the intense heat of the summer renders such a provision unnecessary.

The position chosen by the Baltimore for its pensile nest is no doubt suggested by instinct as a means of security against the attacks of enemies, especially the black snake, which climbs trees with facility, and which destroys young broods by wholesale, though it is often compelled by the parent birds to retreat Fig 1525 represents a contest between the Baltimore oriole and this subtle foe

The Baltimore oriole clings about the branches in search of insects, and glides as it were along the slender twigs, displaying much grace in its movements its flight is rapid and continuous

Besides insects, it greedily feeds on cherries, strawberries, mulberries, figs and other sweet fruits

The male does not acquire his full plumage till the third year, it is then glowing and brilliant The head, throat, upper part of the back and wings, are glossy black, the lower part of the back and whole under parts rich orange, deepening into vermilion on the breast. A band of orange divides the black on the shoulders, edges of the wing-coverts, secondaries, and in part of the primaries, white. The tail is orange and black Length seven inches and three-quarters The female has the orange much *duller than the male, and the back is clouded with* olive.

1526.—The Pit Pit

(*Dacnis Cayana*) The Pit-pit, as it is termed by Buffon, is a beautiful little bird found in Mexico, resembling the Icteri and Xanthorni in the form of its beak, which is sharp and conical. According to Cuvier, it allies the latter to the gold-crests (Regulus), 'Les Figuiers'

The Mexican name of this species is Elototl. Hernandez says that *it lives about the trees in the* Tetzcocan Mountains, and is eatable; but that being destitute of a song, it is not kept in the houses of the inhabitants. The general colour is cærulean blue; the forehead, shoulders, wings, and tail black.

1527.—Pensile Nests.

These nests, hanging to the extremity of the leaves of a palm, are regarded as the productions of a species of Icterus, which we greatly doubt; they appear to be Indian, and are most probably the workmanship of a species of weaver bird (Ploceus), but which we will not attempt to identify The Icteri do not build, like the weaver-birds, in societies; the pairs keep themselves apart during the breeding-season, but most, if not all, the weaver-birds form colonies, and hang their nests in clusters from the twigs of trees and long leaves of different kinds of palms.

1528.—The Cow-Troopial

(*Molothrus Pecoris*) Icterus Pecoris, Temminck; Emberiza Pecoris, Wilson; Cowpen-bird, Cow-Blackbird, and Cow-Bunting of the Americans. We have previously alluded to this bird, which, like our cuckoo, prepares no nest, but selects those of other birds, distributing an egg to each, and leaving it to be hatched and the nestling to be reared by foster-parents.

The birds whose nests it chiefly selects appear to be those of the red-eyed and white-eyed flycatchers, and the Maryland yellow-throat; but those of the blue bird, the indigo-bird, the chipping sparrow, the blue-eyed yellow warbler, the blue-grey flycatcher, the golden crowned thrush, and Wilson's thrush are also used for this purpose. According to Nuttall, "When the female is disposed to lay, she appears restless and dejected, and separates from the unregarding flock. Stealing through woods and thickets, she pries into the bushes and brambles for the nest that suits her, into which she darts in the absence of its owner, and in a few minutes is seen to rise on the wing, cheerful and relieved from the anxiety that oppressed her, and proceeds back to the flock she had so reluctantly forsaken. If the egg be deposited in the nest alone, it is uniformly forsaken, but if the nursing parent have any of her own, she immediately begins to sit The red-eyed flycatcher, in whose beautiful basket like nests I have observed these eggs, proves a very affectionate and assiduous nurse to the uncouth foundling"

The same author, in 1831, saw a hen red-eyed flycatcher sitting on two eggs and one of the cow-bird, and he adds that this species, Vireo olivaceus, and (more lately) Vireosylva olivacea of Bonaparte, Muscicapa olivacea, Linn, appears to be its most usual nurse He has known this Vireo begin her incubation with only an egg of each kind, whilst in other nests he has observed as many as three belonging to the Vireo, as well as that of the intruder, and he suggests that, from the largeness of the egg, the nest probably immediately feels full to the incubating bird, so as to induce her to sit directly, when the larger egg being brought nearer to the body of the nurse than her own, is first hatched, generally, as he believes, on the twelfth or thirteenth day The legitimate eggs are hatched about a day later, and the young are often stifled by the superior size of the stranger, which is affectionately nursed by the poor dupe of a dam, when the young are dead, they are conveyed to a distance by the parent and dropped, but they are never found immediately below the nest, as would be the case if they were ejected by the young cow bird, as is done by the young cuckoo "Indeed," continues Mr Nuttall, "as far as I have had opportunity of observing, the foundling shows no hostility to the natural brood of his nurses, but he nearly absorbs their whole attention, and early displays his characteristic cunning and self-possession When fully fledged, they quickly desert their foster-parent, and skulk about in the woods, until at length they instinctively join company with those of the same feather, and now becoming more bold, are seen in parties of five or six in the fields and lanes gleaning their accustomed subsistence They still, however, appear shy and watchful, and seem too selfish to study anything more than their own security and advantage

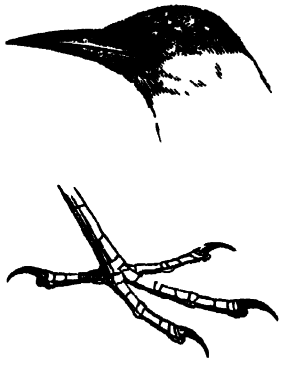
The cow-bird is but a poor songster. It is a migratory species, appearing in the middle and *northern States of the Union at the beginning of* April, and returning southwards on the approach of winter. The male has the head and neck blackish-brown, the rest of the plumage glossy black, with greenish reflections on the upper parts, and a violet lustre on the breast. The female is sooty-brown above and pale beneath, as are also the young, with the breast spotted. The foremost of the upper figures is the male, the other the female, the lower a young bird.

An allied species (Le Troupiale Commun of *Azara), seen by Darwin in large flocks near Maldonado,* is said to have the same habit with regard to its eggs as the Molothrus Pecoris.

1525.—Baltimore Oriole and Black Snake.

1526 —Pit-Pit.

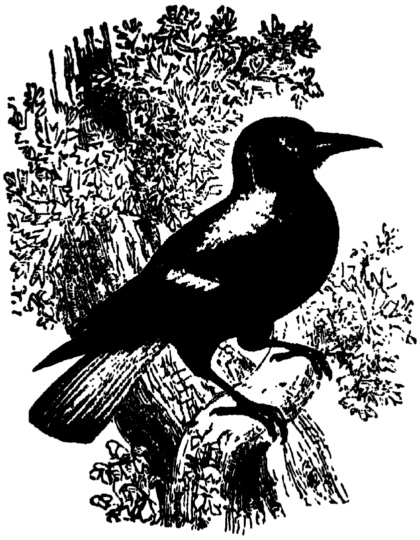
1524 —Baltimore Oriole and Nest


1529 —Head and Foot of Starling

1527.—Pensile Nests

1528.—Cow-Troopials.

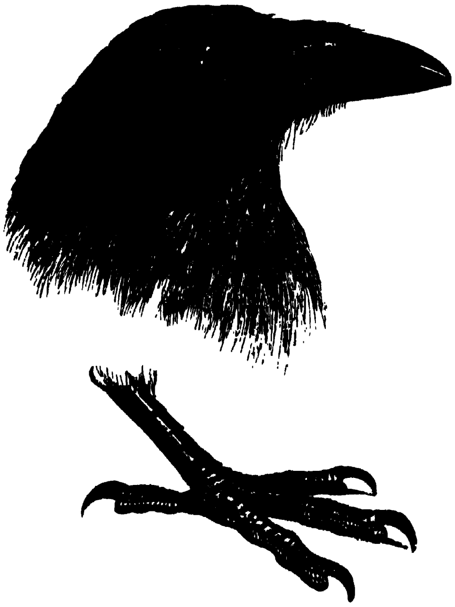
1530.—Red-billed Pique-Bœuf.



1533.—Piping Crow.

1532.—Java Mino Bird.

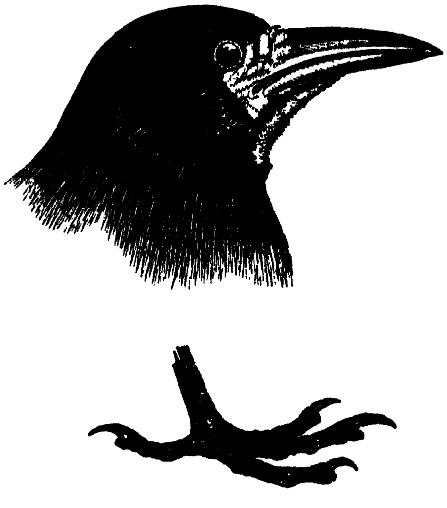
1534.—Yellow billed Myophone.



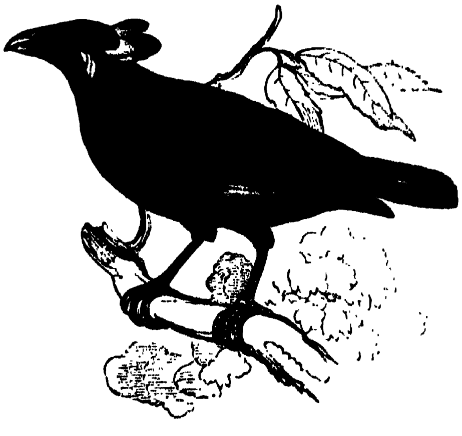
1536.—Head and Foot of Raven.

1535.—Satin-Bird.

1537. Royston Crow.



1538. Head and Foot of Rook.



1531.—Mino-Bird.

1529.—The Starling

(*Sturnus vulgaris*). Head and Foot. Stare, English; l'Étourneau commun of the French; Gemeiner Star, Bechstein.

The genus Sturnus is the typical form of the present family. The bill is depressed from the base as far as the tip, which is slightly inflected and notched. The lateral toes are equal; the middle as long as the tarsus; wings lengthened and pointed.

The starling is generally spread over Europe, and also inhabits China, the Himalaya, the Cape of Good Hope, and the northern region of Africa. It is common in our islands, and is often kept in confinement, becoming very familiar, and learning to utter tunes, words, and even sentences. Its natural song is a low sweet warble.

During the breeding-season the starling lives only in pairs, constructing its nest in the crevices of towers, steeples, old ruins, the cliffs of rocks, and even the deserted nests of the crow. The eggs are pale blue.

At the conclusion of the breeding-season starlings congregate in immense flocks, which, often intermingled with rooks, scatter themselves over the fields in search of food, and mix fearlessly among the grazing cattle, attracted by the insects settling on their hides or creeping about on the ground. On the approach of dusk the scattered multitudes collect into one vast phalanx, wheeling and sweeping through the air, and performing the most beautiful aërial evolutions, as if obeying definite signals of command, while the assemblage bears on to some place of repose. This is generally a thick coppice or extensive reed-bed, and over it the mass wheels in varying figures, now sinking, now rising, now suddenly turning, till at length the horde settles for the night, long keeping up a noisy chattering concert.

In Ireland, according to Mr. W. Thompson, the starling is migratory, their southward movement commencing towards the end of September. In our island this bird is certainly partially migratory, quitting one part of the country for another; and we may readily conclude that many flocks leave our shores for a more southern residence.

The starling undergoes several changes of plumage before acquiring the permanent dress. The young during the first autumn are of a uniform ashy brown. In October they assume a plumage of black, with bronze, violet, and green reflections on each feather, except the quill and tail feathers, being tipped with a spot of yellowish white. This condition of plumage lasts till the third year, when the bill becomes yellow, and the throat and chest covered with loose lanceolate feathers, of a rich black with purple and golden-green reflections. The head and under parts are of this hue also. The back is greenish-black, with small triangular spots of reddish white. This is the permanent style of plumage.

Family BUPHAGIDÆ (PIQUE-BŒUFS).

This family, the affinities of which are not very clear, though in some points we trace a similarity to the Sturnidæ, contains only one genus, embracing a limited number of species. The bill is strong, large, obtuse, and nearly quadrangular; the lower mandible is stronger than the upper, and both are swollen towards the point. The wings are moderate; the toes are furnished with hooked compressed claws. We believe that only two species are known, both natives of Africa, including Madagascar.

These birds live on the parasitic insects infesting the hides of quadrupeds, and on the larvæ hatched under the skin of the larger ruminants, as camels, oxen, and the heavy antelopes. Fixed on their back by means of "his cramp-irons of claws," the Pique-bœuf digs and squeezes out by his forceps of a beak the larvæ that lie beneath the festering skin, to the patient's real benefit, who patiently submits to the operation.

The Buphaga Africana is distributed through Southern Africa, and found also at Senegal.

1530.—The Red-billed Pique-bœuf

(*Buphaga erythrorhyncha*). This species is a native of Northern Africa, and has been brought also from Madagascar. The upper parts, neck, and throat are ash-brown glazed with bluish; the lower parts are of a yellowish rust-colour; the bill is coral-red. Length seven inches: about a third less than the B. Africana.

Family CORVIDÆ (CROWS).

This family contains an extensive series of birds, characterized by a strong conical bill more or less compressed at the sides, and often with the ridge of the upper mandible arched. The nostrils are covered with stiff or bristly feathers directed forwards, and sometimes with a close velvet-like tuft. The Corvidæ are to a great extent omnivorous; they are bold, cunning, and inquisitive, and are easily tamed: some are proverbial for their imitative faculties and habits of pilfering. The instinct of acquisitiveness, whatever the organ may be, is greatly developed; all are acquainted with the thievish propensities of the magpie and its fondness for glittering objects.

There are, however, placed provisionally by many naturalists within the pale of this family, several genera, which, it must be acknowledged, have but a remote affinity to the true Corvidæ, and ought perhaps rather to be collected in one or more distinct family groups, than assigned to any yet established. We allude to the genera Eulabes (Mino-birds), Barita (Piping Crows), Myophonus, Ptilonorhynchus, &c., of which we have pictorial examples.

1531.—The Mino-Bird

(*Eulabes Indicus*, Cuvier). Gracula religiosa, Linnæus. The genus Eulabes is distinguished by a stout compressed beak, deep at the base. The nostrils are round; the head is ornamented with two loose hanging folds of naked skin. In habits and manners these birds resemble the starlings, frequenting temples and buildings. According to Cuvier, they have some alliance with the Rollers; but we think, with Mr. G. R. Cray, that they form a group within the circle of the Corvidæ.

The Mino-bird, Beo and Mencho of the Javanese, Teeong of the Sumatrans, is a native of India and the Indian Islands, where it is highly valued for its powers of imitation, easily learning to repeat not only words, but whole phrases, and that with surprising distinctness. Marsden indeed says that it has the faculty of imitating human speech in greater perfection than any other of the feathered tribe: and Bontius, who calls it Pica seu Sturnus Indicus, celebrates it in the following Latin lines—

> "Psittacus, Eois quamvis tibi missus ab oris
> Jussa loquar; vincit me Sturnus garrulus Indus."

In captivity this bird is lively, confident, and docile, and bears our climate well. Its colour is a deep velvety black, with a white mark on the base of the quill-feathers. The bill and feet are yellow, the occipital wattles and a naked space below each eye bright orange-colour. The feathers of the forehead and around the base of the beak are short and velvety. Size that of a thrush: insects and fruits constitute its food.

1532.—The Java Mino-Bird

(*Eulabes Javanus*, Cuv.). In general form and habits this species agrees with the preceding, but is destitute of the white bar on the wing, and has the beak more crooked at the tip, without the trace of a notch; the naked space on the cheeks is more contracted, and runs into the occipital wattles.

1533.—The Piping Crow

(*Barita Tibicen*). The genus Barita, assigned by Cuvier to the Shrikes, but regarded by Vigors as one of the Corvidæ, has the bill hard, long, and powerful, convex above, slightly hooked at the tip, near which both mandibles are notched. Nostrils lateral; legs stout. The birds of this genus may be appropriately termed Shrike-Crows: they form the genus Cracticus of Vieillot.

The Piping Crow is common in New South Wales, inhabiting the Blue Mountains in small flocks, and as Caley informs us, on the authority of the natives, building in trees, its nest consisting of sticks lined with grass. It is said to make a loud whistling noise when perched high on the trees early in the morning, and not to be migratory. In captivity it is very amusing, from its powers of mimicry; it imitates the voices of men and animals, and easily learns to whistle tunes, its notes being clear and powerful.

This species is less than the common crow in size; the back of the neck, the back and shoulders, and the bases of the wing-coverts are greyish-white; there is some pure white at the base of the tail; the rest of the plumage is deep black; legs dusky; bill bluish at the base and black at the tip.

1534.—The Yellow-Billed Myophone

(*Myophonus flavirostris*). The birds of this genus are all Oriental. They are characterized by a large strong bill, furnished at the gape with some bristles and feathers turned forwards; the wings are rounded; the nasal depression is membranous and suboval; the tail rounded. It is very questionable whether this genus really belongs to the Corvidæ.

Mr. Gould, who has figured and described two species in his 'Century,' viz., M. Horsfieldii and M. Temminckii, observes that with respect to their habits little can be said with any certainty, but from their lengthened tarsi and general structure they apparently depend in a great measure for their subsistence upon worms, insects, and larvæ; the manners of M. Temminckii on the ground are said to resemble those of our common blackbird.

The Yellow-billed Myophone is a native of Java: its plumage is of a deep blue-black with a splendid metallic lustre; the bill is of a rich yellow; the feet are black.

1535.—The Satin-Bird

(*Ptilonorhynchus sericeus*, Kuhl, Gould, &c.). Satin Grakle of Latham; Kitta holosericea, Temminck.

This splendid bird must be enumerated among those of which the true situation in the natural arrangement of birds is doubtful. The bill is short, thick, convex, compressed on the sides, with the nostrils, by the silky feathers of the forehead, and a row of small bristles; the wings are pointed; the legs and feet robust.

The male is of a rich brilliant-blackish blue; the quills and tail-feathers dead-black; a double row of silky and velvety bluish-black feathers at the base of the beak: length thirteen inches. In the female the upper parts are of an olive-green; the quills and tail-feathers of a red-brown; the wing-coverts varied with brown and dusky olive; the under parts greenish, barred with black; the front of the neck marked with whitish horizontal spots bordered with black dashes.

The Satin-bird frequents the cedar-brushes and dense thickets of New South Wales, to which district it appears to be confined: in its habits it is shy and recluse, and few males are to be seen in their brilliant plumage, which is not attained until the third year; flocks of young birds, however, resembling the female in plumage, are occasionally to be seen on the skirts of the brush, but the adult birds are not to be observed without care and perseverance. This is one of the bower-building birds, constructing a bower, or run, by means of two short parallel hedges composed of twigs interlaced together, so artfully arranged that the inner aspect of each artificial hedge is smooth, offering no impediment to the passage of the birds, while the outside is rough with the projecting ends and bifurcations of the twigs. The floor of this run, or short avenue, consists of sticks strewn with shells and bones, and the bower itself is ornamented with the brilliant feathers of various parakeets. Here the birds play, and sportively pursue each other, perpetually traversing the avenue. This, however, is not their nest, which is so artfully concealed that it has not been discovered even by the sharp-eyed natives.

The Satin-bird utters two different strains; one of rich and melodious notes, the other a harsh cry indicative of alarm or anger. See Gould's 'Birds of Australia,' in which the habits of this bird and an allied species (Chlamydera nuchalis) are fully detailed.

1536.—The Raven

(*Corvus Corax*, Linn.), Head and Foot. Le Corbeau of the French; Kolkrabe of the Germans. The genus Corvus, containing the raven, rook, crow, jackdaw, &c., presents us with the typical forms of the present family; and is widely spread, some of the species being found in every quarter of the globe. The bill is strong, conical, cultrated, straight at the base, but bending slightly at the tip; the nostrils are covered by stiff reflected bristly feathers.

The raven is common over the whole of Europe and a great portion of Asia: few birds have obtained a greater share of notoriety. Among the Romans it was a bird of augury, and its flight, its hoarse croak, and actions, were regarded as the presages of good or evil. It was the military standard of the Danes, an omen indeed of approaching desolation; and adopted, perhaps, in compliance with popular superstition, which rendered the bird itself an object of dread—the foreboder of calamity, disease, and death. Thus in 'Macbeth,'

> "The raven himself is hoarse
> That croaks the fatal entrance of Duncan
> Under my battlements."

The raven is a bold, hardy, powerful bird, of omnivorous habits, feeding on carrion, and attacking ducks, chickens, and small quadrupeds, which its strong pointed beak enables it to despatch with a few strokes. It even assaults young lambs and sickly sheep, picking out their eyes, and leaving them to a miserable lingering death. In addition to these, eggs, grain, grubs, reptiles, and shelled mollusks are among the articles of its bill of fare. It sometimes visits the seashore in search of putrid fish and animal exuviæ.

The favourite resorts of this bird are bold mountain precipices, where, in some inaccessible ledge—or, as we have seen, on the branches of some stunted yew-tree, starting as it were out of the rifts of the tremendous precipice—it builds its nest, occupying the same spot for a long succession of years. In districts where the character of the scenery is different, it makes its nest in tall trees, which it annually visits for the same purpose. The nest is composed of sticks and lined with wool. The eggs, from five to seven in number, are of a dark green, blotched with black. Ravens are generally seen, like the crow, in pairs, but sometimes during the winter in small companies of eight or ten; their flight is high, and they often wheel and tumble in the air. This bird, arrayed in glossy blue-black plumage, is often kept tame, and soon becomes very familiar; often indeed mischievously so, from its propensity to secrete glittering articles, as keys, glass, silver, and the like; nor are eggs or the poultry of the yard quite secure from its incursions. It is very daring in self-defence. Mr. Thompson states that one which lived in the yard attached to the chief inn at Antrim for about fifteen years, had occasional encounters with game-cocks, brought thither to engage it; and bets were pending on the issue. The raven in every instance proved the victor; it avoided the blows of the cock, and acted only on the defensive until it could manage to lay hold of the cock's head, which was in an instant crushed in its powerful beak, its antagonist falling lifeless on the ground. The length of the raven is twenty-six inches.

1537.—The Royston Crow

(*Corvus Cornix*); Hooded Crow; Grey Crow. It is the Corneille mantelée of the French; Kraka of the Swedes; Grau Krähe of the Germans; Mulacchia, Cornacchia, and Corvo palumbino of the Italians. This species is widely spread over Europe, being migratory, except in Italy, according to the Prince of Canino; and in Ireland, as Mr. Thompson assures us, and the western and northern parts of Scotland. It was found at Smyrna by Mr. Strickland, and it inhabits the Grecian Archipelago, the countries between the Black and Caspian Seas. Latham states that it is common in some parts of India.

In the southern parts of England the hooded crow is a winter visitor, departing northwards in April; though there are instances of its remaining during the summer to breed. In the north and west of Scotland, and in the Hebrides, Orkney, and Shetland Isles, it is very common; and also in Ireland, frequenting the seashore and the banks of tidal rivers; but it is also to be seen far inland. It builds on rocks, as well as in tall trees, the beech or pine being usually selected. Mollusks, crabs, and the dead animal matters left by the retiring tide are its common articles of diet; and it has been often observed to soar aloft, and drop a shell-fish on the rocks from its elevation, in order, as is asserted, to obtain the included delicacy. During the breeding-season it is very destructive, according to Mr. Selby, to the eggs and young of the red grouse, and, like the raven, will frequently attack lambs and weakly sheep. It is generally seen in pairs but sometimes in small flocks. The plumage of this species is of a fine ash-grey, excepting the head, throat, wings, and tail, which are black, with blue and green reflexions. Length twenty-two inches.

1538.—The Rook

(*Corvus frugilegus*), Head and Foot. Graye, Grolle, Freux, and Frayonne of the French; Schwartze Krähe of the Germans; Roka of the Swedes; Cornacchia nera and Cornacchione of the Italians: Ydfran of the ancient British.

The rook is spread over the greater portion of Europe, wherever suitable districts invite its colonization. Wooded and cultivated tracts of country are its favourite haunts, and in our island it is particularly abundant· In its habits it is eminently gregarious, associating in flocks, which scatter themselves over fields and corn-lands in quest of food. They follow the track of the plough or the harrow, clearing the soil of grubs, the larvæ of the chaffer-beetle (Melolantha vulgaris) and of the Harry-long-legs (Tipula oleracea), which are particularly destructive to the roots of grain and clover. The service they render the farmer in this respect is very great, and far counterbalances the mischief they may do in fields where the young blades of wheat are just starting above the ground, or by picking up the newly-planted "cuttings" of potatoes, to the detriment of the crop. The rook does not in fact deserve the name of corn-eater or corn-gatherer (frugilegus), and Mr. Selby asserts that wherever its extirpation has been effected, the most serious injury to the corn and other crops has invariably followed, from the unchecked devastations of the grub and caterpillar. In orchards and gardens the rook occasionally does mischief, from its partiality to ripe cherries, pears, and walnuts, soon stripping the trees of their produce. But all the injury which this bird commits may be easily obviated by attentive watching at the proper time, and its services thus secured unalloyed. While engaged on their foraging expeditions, these birds display much cunning and precaution; they have sentinels scattered around the main body, upon whose cry of alarm they all rise upon the wing and sail away. The very sight of a gun is sufficient to disturb them, and hence it is often said that "rooks smell powder." As evening approaches, long strings of these birds, at a considerable elevation, may be seen wending their way to their roosting-place. In the early spring, the rooks are all on the alert, busy in their rookery, repairing the old nests and constructing new ones; all is noise and bustle, and many are the squabbles about the right of sticks and wool, till the nests are all ultimately completed. When the females begin to lay, they are fed by the males, and, as Gilbert White says, receive their bounty with a fond tremulous voice and fluttering wings, and all the little blandishments that are expressed by the young in a helpless state. This gallant deportment of the males is continued during the whole season of incubation. Fig. 1539 represents a rookery. The partiality of these birds to their accustomed breeding-places is notorious, so that though their trees, once in the fields, become in process of time encircled by buildings, they still remain inhabited by the colony. There were formerly rookeries in different parts of the metropolis: one is on record as having been long frequented in the Temple Gardens. There was another extensive establishment in the Gardens of Carlton Palace, which, when the trees were cut down in the spring of 1827, was removed to the trees behind New Street, Spring Gardens; and there is one on the trees near Fife House, at the back of Whitehall. The trees in St. Dunstan's Churchyard, not far from the Tower, and those in the College Garden behind the Ecclesiastical Court in Doctors' Commons, were formerly tenanted by rooks. At Newcastle a rookery, according to Bingley, existed at no great distance from the Exchange; and it is said that a pair of rooks, after an unsuccessful attempt to establish themselves in it, took refuge on the Exchange spire, and succeeded in building a nest on the top of the vane, frequenting the same spot every year till 1793, soon after which the spire was taken down. (See Fig. 1540.)

Around the base of the rook's bill is a space denuded of feathers, which does not appear till the bird is adult, and which is by some attributed to the habit of the bird in thrusting its beak into the earth in quest of grubs and worms, and by which means the feathers are worn away. Whether it results from this cause, or is a specific character (for it occurs in other birds) and indicative of maturity, is a question not settled. For ourselves we cannot see how the digging is to produce it, and that too to the same extent in every individual.

1541.—The Philippine Crow

(*Corapica Sinensis*, Lesson). This species, with another, the Kitta thalassina of Temminck, constitutes the genus Corapica of Lesson, the situation of which is by no means clear. Lesson, though he allows that the genus exhibits the forms of the Rollers and Crows, thinks it would be better placed among the dentirostral group. The true Rollers, we conceive, have little alliance with the Corvidæ.

In this genus the bill is robust, the point is recurved, and slightly notched, with the nostrils furnished with short bristles.

The present species is a native of the Philippine Islands: it is about eleven inches in length: the bill is red, the legs reddish. The head is crested with loose feathers. General colour of plumage above pale green, clouded with a yellowish-green tint; a black band encloses the eye and runs round the back of the neck; throat of a yellowish-green; lesser wing-coverts brown; quill-feathers olive on their external edge; the secondaries terminated with greenish-white. Of his habits we have no details.

1542.—The American Blue Jay

(*Garrulus cristatus*). Cyanocorax cristatus, Boié. Our European Jay, with which all are familiar, is a very beautiful bird, but not to be compared with the Blue Jay of America. This elegant species, arrayed in blue varied with purple and white, and barred on the wings and tail with black, is a native of the woods of North America, and is remarkable for its noisy chattering, its variety of tones, its screams, cries, and squalling. It is a shy recluse bird, tenanting the recesses of the forest with its male, but in the months of September and October uniting into flocks of forty or fifty, which straggle irregularly through the woods in search of food, acorns and berries.

During this season they lose part of their shyness, and keep chattering to each other in a variety of strange and querulous notes.

The blue jay builds a large nest, frequently in the cedar, sometimes in an apple-tree, and lines it with dry fibrous roots. The eggs, five in number, are of a dull olive, spotted with brown. "The male is particularly careful of not being heard near the place, making his visits as silently and secretly as possible. His favourite food is chestnuts, acorns, and Indian corn; he occasionally feeds on the caterpillars, and sometimes pays a plundering visit to the orchard, cherry-row, and potato patch." He also plunders the nests of small birds of their eggs and young, tearing the callow brood by piecemeal, and spreading alarm and sorrow around him. Sometimes he will assault and kill full-grown birds, as warblers and finches, and devour them.

To owls and hawks the blue jay manifests the most inveterate antipathy, and joins with others to make a train of persecutors, which daringly annoy and torment the common enemy, till the hawk, singling out the foremost, darts at it, and bears it off in triumph, when in confusion and terror the crowd take flight in different directions.

In captivity the blue jay soon becomes familiar, and readily learns to utter words and sentences; but, like all its race, it pilfers everything it can carry away, hiding the stolen effects in various holes and corners.

The common jay of Europe, too well known to need a detailed description, displays very closely the same habits and manners as its American relative, and is equally noted for its variety of tones and harsh cries, for its plundering propensities, and partiality for acorns, beech-mast, &c., as well as for cherries and peas. It breeds in the thickest coverts. The nest consists of a cap-shaped basket of matted roots, externally defended by an outer case of intertwined twigs, which also form a sort of platform, secured to the fork of the branch on which the structure rests.

The eggs are pale blue, thatched with yellowish brown. Fig. 1543 represents the nest of the European jay (Garrulus glandarius).

1544.—Crypsirina,

Bill of. Crypsirina is the generic title given by M. Vieillot to a group of birds termed, by Le Vaillant, Temia, and from which the genus Phrenotrix of Dr. Horsfield can scarcely be separated. M. Temminck ranges them under the title of Glaucopis.

Cuvier remarks, that these birds have the carriage and tail of the Magpies, an elevated bill with the upper mandible convex, and the base furnished with velvety feathers, nearly as in the Birds of Paradise. The species most anciently known is, he observes, the Corvus varians of Latham, which is of a bronzed green colour, and found in India and Africa.

Mr. Swainson thus characterises Crypsirina:—Bill shorter than the head, much compressed; the culmen considerably arched, and curved from the base. Nostrils small, basal, concealed by incumbent feathers, which are either soft or setaceous. Wings short, much rounded; the primaries hardly longer than the secondaries. Tail-feathers broad and obtuse. Feet moderate, arboreal. The middle toe and claw short, but as long as the tarsus.

1545.—The Wandering Pie

(*Crypsirina vagabunda*). Pica vagabunda, Wagler; Dendrocitta vagabunda, Gould. This bird, which is a native of the Himalaya Mountains, is thus described by Gould, in his 'Century:'—"The specific denomination of this bird is bestowed upon it in consequence of its peculiar habit of life. The Pica vagabunda, or Wandering Pie, unlike the typical Pies, who remain constantly stationary in one neighbourhood, seeking for their food in its vicinity, wanders from place to place, travelling over a large space of ground, and not evincing a partiality for any particular situation. The shorter tarsus of this bird, indeed, and its more elongated tail, are indicative of trees being its most usual resort, where fruits and berries offer a supply of its natural food; whereas in the more typical Picæ the longer tarsus and more elongated beak fit them for digging in the ground, in which they almost solely seek for subsistence. This species is more widely distributed than any of its congeners, being found in considerable abundance all over India. The head, neck, and crest are of a smoke colour or a blackish grey; the back light cinnamon; the centre of the wings grey; the quills black; tail grey, each feather being tipped largely with black; the under surface is pale-tawny; the beak and tarsi black. Length sixteen inches and a half, beak one and a quarter; tarsi one and a quarter; tail ten inches."

1546.—The Benteot

(*Crypsirina Temia*). Phrenotrix Temia, Horsfield. Dr. Horsfield, who gives Corvus varians as the synonym of his Phrenotrix Temia (the Chekitut or Benteot of the Javanese), states that although not a rare bird in Java, his Phrenotrix is by no means familiar, and never approaches the villages and habitations, like many others. "It can only be observed near solitary hamlets situated in tracts recently cleared for cultivation, where its food is abundantly supplied by the insects contained in the rich mould, and by the wild fruit-trees about the skirts. In consequence of the shortness of the wings, its motions are slow; it is chiefly seen about noon sailing heavily through the air in a right line

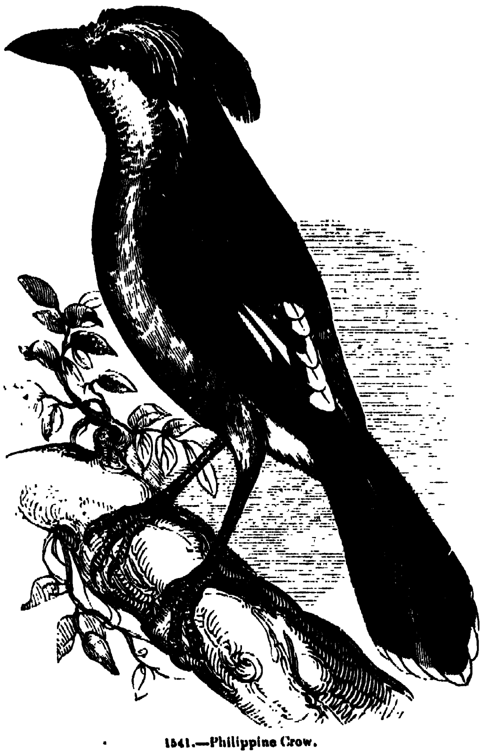
543.—American Blue Jay.

1544.—Bill of Crypsirina.

1545.—Wandering Pie

1547.—Trimmed Pie.

1539.—A Rookery.

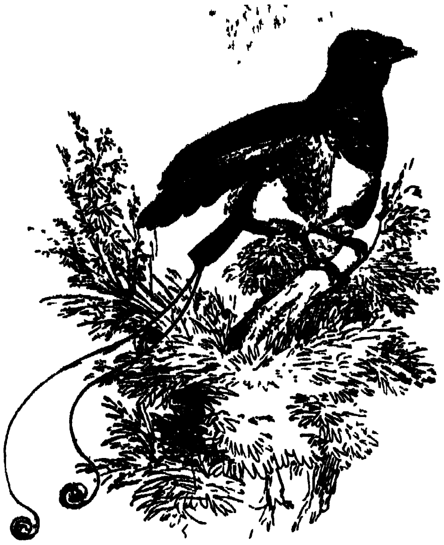


1541.—Philippine Crow.

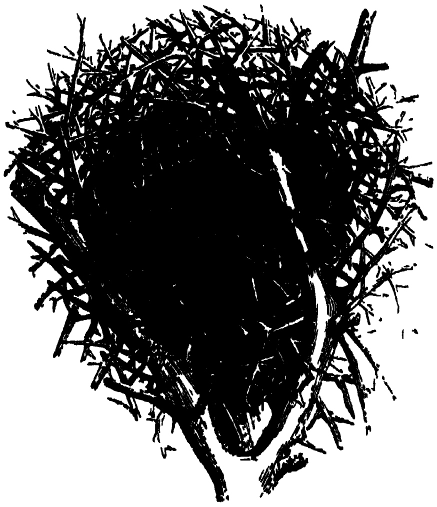
1540.—Rookery on Newcastle Exchange Spire.

1546.—Bentoot,

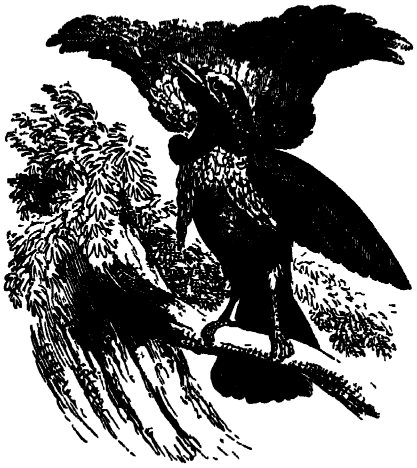
1542.—Nest of European Jay.



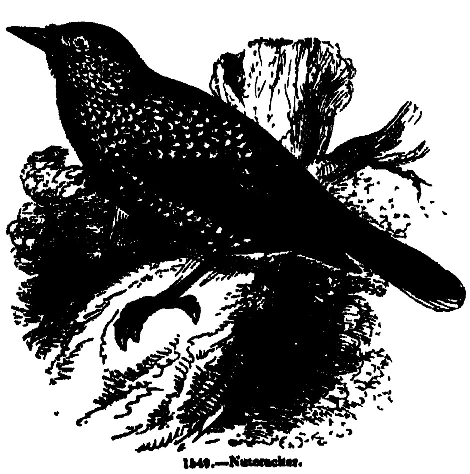
1554.—King Bird of Paradise.



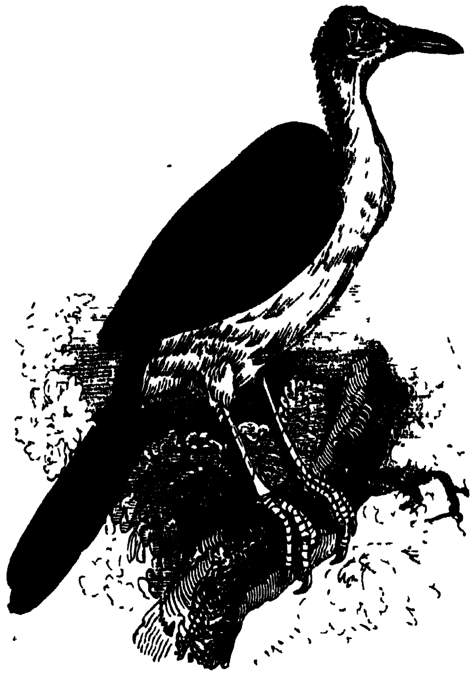
1548.—Nest of Magpie.



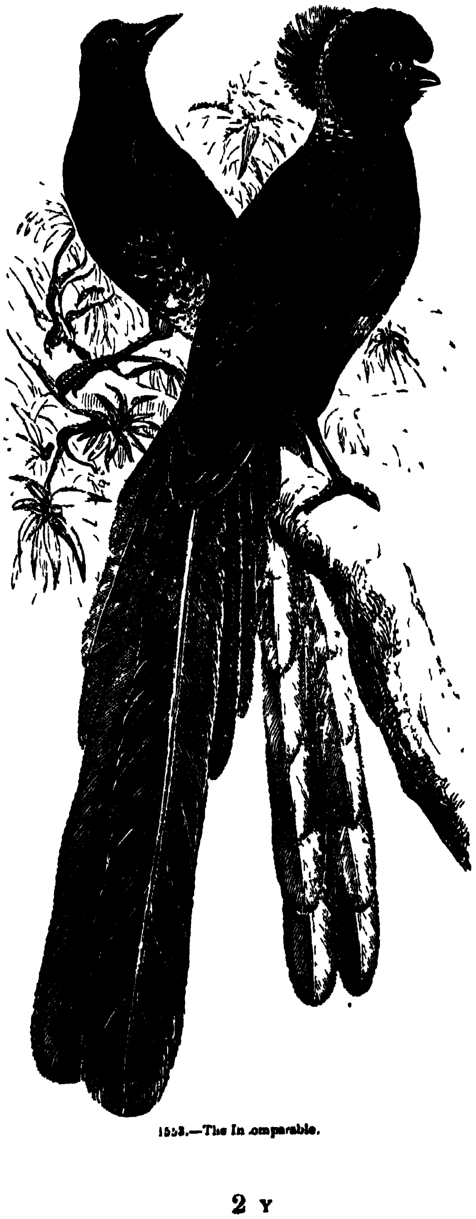
1556.—Superb Bird of Paradise



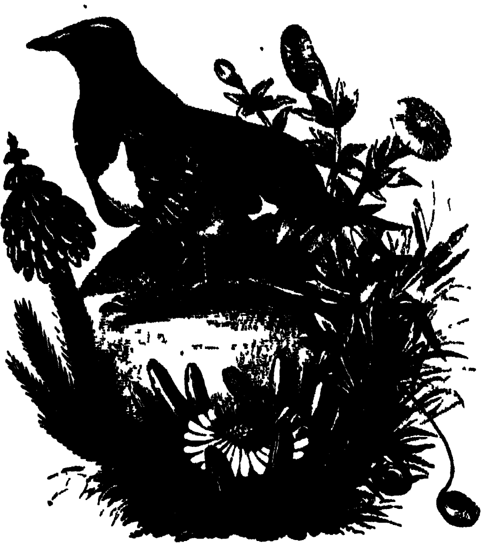
1549.—Nutcracker.



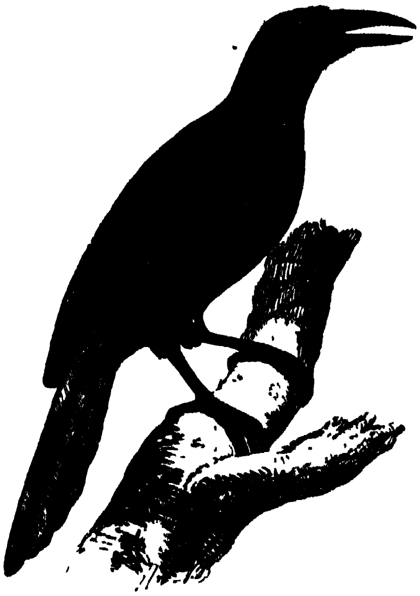
1551.—Bald headed Crow



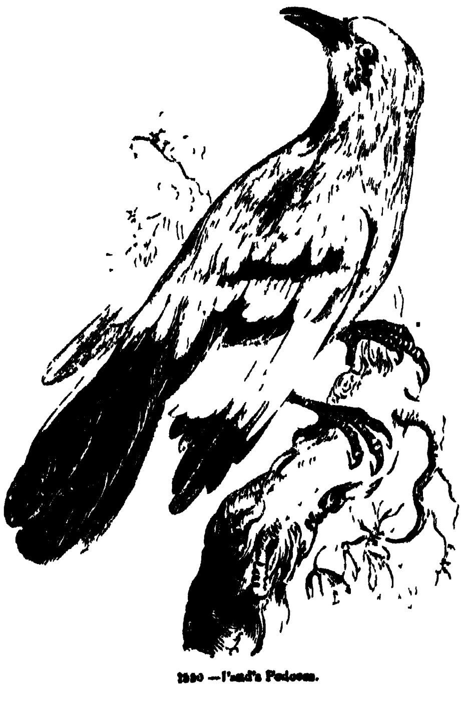
1553.—The Incomparable.



1555.—King Bird of Paradise.



1552.—Paradise Grakle



1550.—Pand's Podoces.

towards the trees surrounding the openings in the forest. The strength of the bill and of the claws shows its adaptation to feed on fruit and insects." ('Zoological Researches in Java.') General colour sooty green, with bronzed reflexions.

1547.—THE TRIMMED-PIE

(*Crypsirina temnura*, Swainson). Glaucopis temnura, Forster: Calæas temnura, Vieillot. This bird, which is a native of Cochin-China, is about twelve inches in length. It is remarkable for a tail of graduated feathers, each appearing as if cut and trimmed at the tip with a pair of scissors. The whole of the plumage is black, a little lustrous on the wings and tail. Of its habits little is known.

1548.—THE NEST OF THE MAGPIE

(*Pica caudata*, Ray). Pica melanoleuca, Vieillot; Corvus Pica, Linnæus. The magpie is a native of Europe generally, and is common in our island, where it is noted for its destructiveness among the young broods of feathered game, as pheasants, partridges, &c. Nothing, in fact, comes amiss to its voracious appetite—eggs, carrion, frogs, mice, insects, fruits, and grain, are all acceptable: and it is hated alike by the farmer and the gamekeeper. It must, however, be confessed that, plunderer as it is, it is an interesting bird. It is active, daring, animated, and intelligent; it is the first to give shrill warning of the approach of the skulking fox, the cat, the hawk, and the owl, and no bird harasses the intruder with greater pertinacity. Resolutely does it defend its nest, but it is too ready to attack those of other species, which it mercilessly despoils; sometimes, however, meeting with a signal defeat.

The magpie is generally seen in pairs, but very early in the spring, as we have often witnessed, several assemble together, and in some retired field, or on the skirts of a wood or coppice, appear to hold a sort of conference, during which they utter a clamorous chattering. On being suddenly disturbed, they take to flight in different directions.

The nest of this bird is a substantial edifice, generally placed in the top of a tall tree, or amidst the dense branches of an elevated old hawthorn. It consists of an external basket-work of sticks, mostly thorns, well united together, those forming the foundation being mixed with turf and clay. The inside of this basket-work, which is in the form of a circular cup, is lined with a thick layer of well-wrought clay, over which is arranged an inner layer of pliable roots and fibres neatly interwoven. The whole is then covered with an elevated dome composed of entertwined sticks of the thorn or the blackthorn; this is evidently intended as a framework of defence: an aperture is left in the side for the ingress and egress of the bird. The whole mass is of large size, and on the open-topped elm or ash near the farm or cottage of the labourer the dark ball is a conspicuous object. The eggs are of a greenish-white mottled with brown. In captivity the magpie is very amusing from its archness and cunning; it is fond of stealing slily behind people and suddenly pecking their heels and then rapidly hopping away. Glittering things attract its curiosity and excite its cupidity, and many a lost article is often recovered from the hiding-place to which it is in the habit of carrying its plunder, and which by watching its movements may be detected.

1549.—THE NUTCRACKER

(*Nucifraga caryocatactes*). Corvus caryocatactess, Linnæus; Casse-noix of the French; Nocciolaja of the Italians: Kurz und Langschnäbliger Nussknacker of Brehm; Tanner Heher (Pine Jay) or Türkischer Holzschreyer of Frisch: Notwecka, Notkraka, of the Swedes; Noddekrige of the Norwegians, Adeiryn y Cnau of the ancient British.

Among the birds which prove how difficult it is to frame a system illustrative of natural affinities may be enumerated the present. The nutcracker in its general habits and manners resembles the jay, but in many particulars it approximates to the woodpeckers; it climbs about the branches, using its tail as a support, the feathers of which are often much worn; it bores the bark in search of insects, and it nestles in the hollow of trees. Ornithologists have, however, almost universally referred it to the Corvidæ, between which and the woodpeckers it forms a link of union.

This species is of rare occurrence in our island, being only a casual visitor, but is abundant in the mountain forests of Norway, Sweden, and parts of Germany, and in some districts is a bird of passage. It is found also abundantly in Russia and Northern Asia. The food of the nutcracker consists of the seeds of the pine, berries, and nuts, which latter it breaks by repeated strokes of the bill; it also devours insects and their larvæ, in quest of which it climbs about the trunk and branches, tapping the bark with its bill, and inserting it into the crevices. It is mostly seen in flocks, which allow of a near approach, especially while busily engaged with the cones of the pine-trees. The holes of decayed trees are the places selected by this bird for nidification, and frequently enlarges the cavity with its bill. The eggs are of a yellowish-grey colour, with a few spots of bright grey-brown. Temminck states that the nutcracker sometimes devours young birds and eggs, like the jay.

In size the nutcracker equals a jackdaw, but the tail is longer and the form more slender. The plumage is reddish umber-brown; the body, with the exception of the head and rump, being dappled with large white spots, which occupy the centre of each feather; wings and tail blackish shot with green, the feathers of the latter, except the two middle ones, tipped with white; the plumage of the female is less lively, the bill is longer than the head, and conical; the nostrils are concealed by hairs directed forwards; and of the anterior toes the two outer ones are united at their base.

An allied species, Nucifraga hemispila, is a native of the forests of the Himalaya range (see Gould's 'Century'). The Prince of Canino refers the Corvus Columbianus of Wilson (a native of the western parts of North America) to the genus Nucifraga.

1550.—PANDER'S PODOCES

(*Podoces Panderi*). The genus Podoces was founded by M. Fischer for a bird discovered by Dr. Pander in the country of the Kirguis, beyond Oremburg, and of which the habits of life are analogous to those of the crows, and to the Corvidæ he consequently refers it. He gives the following as generic characters:—Bill moderate, bending down at its point, without a notch, and slightly angular: the under mandible shorter than the lower, receiving and covering the edges of it; nostrils large and covered with setaceous overhanging feathers; feet robust and long; claws triangular, very pointed and but little curved. The Podoces Panderi is said to fly badly, but walk well; it lives in flocks. The general colour is greenish-glaucous above; line above the eyes white; legs greenish; bill and claws black.

1551.—THE BALD-HEADED CROW

(*Picathartes gymnocephalus*, Lesson). This extraordinary species (Corvus gymnocephalus of Temminck), the native country of which is unknown, constitutes the type of Lesson's genus Picathartes.

In some respects it reminds one of the vultures of the genus Cathartes, but of its habits we are entirely ignorant, nor are we thoroughly satisfied that it belongs to the Corvidæ. The bill is moderate, the base without hairs, and furnished with a cere; nostrils in the middle of the bill, oval and open; head naked; tarsi long; claws feeble; wings short and rounded; tail long and graduated.

The following is Temminck's description of the species:—"The naked parts of the head offer a particular character. The whole of the auditory meatus is completely destitute of feathers, and even of hairs. A small border, or rudiment of membrane, forms, below the orifice of the ear, a sort of external concha, but little apparent, it is true, in the stuffed specimen, but the extent of which must be remarkable in the living bird. All this part of the organ of hearing, as well as a part of each side of the occiput, is covered by a black skin with a slightly projecting orbicular border, and forming a rounded plaque. The cere which envelops the base of the bill is also black. All the rest of the naked parts of the head, the mesial line of the occiput, which separates the black plaques of the temples, and the upper part of the top of the neck, appear to me to have been red or rosy in the living subject; a slight tint of rosy-yellow covers these parts in those before us. The whole of the nape is covered, clearly, by a whitish and very short down. The front of the neck and all the other parts are white; the back, well covered with thick-set feathers, is of an ashy-black; all the rest of the plumage is bistre-brown; the feet are yellow, and the bill is black. Length fifteen inches." (Temm.)

The only specimen known was in the possession of Mr. Leadbeater of London, and was conjectured to have been brought from Guinea. Whether it still remains in that gentleman's possession we have not been able to ascertain.

1552.—THE PARADISE GRAKLE

(*Chalybæus paradiseus*). Paradisea viridis of Gmelin; le Chalybé de la Nouvelle Guinée, Buffon; le grand Chalybé of Le Vaillant; Oiseau de Paradis vert of Sonnerat; Chalybæus paradisæus, Cuvier (1829).

This brilliant species was by Gmelin referred to the Birds of Paradise, and by Cuvier, in his last edition of the 'Règne Animal,' to a position near the Cassicans (Barita, Cuv.; Cracticus, Vieill.). It will probably be found to constitute one of the links between the Corvidæ and Paradiseidæ.

The Paradise Grakle lives solitary in the forests of New Guinea, where it perches on the tallest trees, feeding upon fruits and berries. According to Lesson, its manners have a great analogy to those of the crows. It is termed Mansinème in the Papuan language. The length of this bird is nearly sixteen inches. The beak is large and strong, as are also the legs and toes. The plumage is iridescent metallic green varying with tints of violet, burnished on the neck and chest with gold and silver on a steel-blue ground. Its history is yet to be ascertained.

Family PARADISEIDÆ (BIRDS OF PARADISE).

Among the feathered glories of creation the Birds of Paradise take the first rank. Nature has lavished on them the most attractive graces of plumage and the most effulgent tints. When first brought to Europe, they were regarded with the utmost admiration, and romantic credulity threw an additional air of interest around them. They were regarded as aërial sylphs, whose home was the bright expanse of sky, where all the functions of life were carried on, their only mode of rest being that of suspending themselves occasionally from the branches by the filamentous feathers of the tail; legs they had none, and they never touched the earth; their food was the morning's dew. This tissue of fiction did not, however, originate with the traveller who first introduced, as is supposed, the Bird of Paradise (P. apoda) into Europe, viz., Antonio Pigafetta, who accompanied Magalhaens in his expedition, and returned to Seville in 1522. This voyage distinctly notes the fact of the legs, which are strong and large, being cut off by the natives previously to their selling the skins. Marcgrave, John de Laet, Clusius Wormius, and Bontius attested to the same fact. Yet the celebrated Aldrovandus, having only seen mutilated specimens, accused Pigafetta of falsehood. Scaliger believed the bird to be footless, as did Jonston (1657); and, last, Count de Buffon, who adorning errors in the graces of polished diction, paints them as birds "qui ne marchent ni ne nagent, et ne peuvent prendre de mouvement qu'en volant." This fable Linnæus has commemorated in the appropriation of the term Apoda to one of the most remarkable species.

The Birds of Paradise are natives of New Guinea and the adjoining islands.

Previously, however, to introducing the true Birds of Paradise to attention, we must refer to a magnificent denizen of New Guinea, for which Vieillot has founded the genus Astrapia, and which he placed near those birds, though it approximates in some points to the thrushes, in which family group Cuvier arranges it, under the name of Merle de la Guinée. It is the following:

1553.—THE INCOMPARABLE

(*Astrapia gularis*). Pie de Paradis. This bird "is distinguished by a tail three times longer than the body, a double crest on the head, and by incomparable magnificence of plumage," which glitters a blaze of iridescence. It is a native of New Guinea, but is by no means common, and we know nothing respecting its habits. The female is not crested, and her colours are less brilliant than those of her gorgeous mate.

Of the true Birds of Paradise we may direct attention to the following species:

1554, 1555.—THE KING BIRD OF PARADISE

(*Cincinnurus regius*). Paradisea regia, Linn.; le Manucode of Buffon. This rare species, one of the smallest of the group, is a native of the Moluccas. It is about the size of a sparrow. Its upper plumage is intense purplish chestnut: a zone of golden green extends across the chest; from each side under the shoulder springs a fan-like plume of six or seven dusky feathers, tipped with the richest golden green; from the tail-coverts spring two long slender shafts, each elegantly terminating in a broad emerald web, rising from one side only of the shaft, and disposed into a flat curl; under parts of body white. In its habits this species is said to be solitary, feeding on fruits and berries.

1556.—THE SUPERB BIRD OF PARADISE

(*Lophorina superba*). Paradisea superba, Linn.; le Superbe, Buffon. In this species the scapulary feathers form a long spreading plume capable of being elevated at pleasure, and there are two pointed lappets on the chest; with the exception of these latter, which are of the most brilliant burnished steel-green, the colour of the plumage is velvet-black, iridescent with green and violet. Length nine inches.

1557.—THE GOLDEN BIRD OF PARADISE

(*Parotia sexsetacea*). Paradisea aurea, Linn.; le Sifilet, Buffon. The general colour of this species is velvety-black; the top of the head is clothed with a greyish crest, and each side of the occiput is ornamented with three long slender shafts, ending in a small oval vane; back of the neck changeable golden green; flanks covered with black loose long feathers, covering the wings and hiding the tail, and capable of being raised up obliquely. Feathers of the throat large and scale-shaped, bordered with iridescent green and gold; tail-feathers velvety, with some long floating filaments. Length about eleven inches.

1558.—THE MAGNIFICENT BIRD OF PARADISE

(*Samalia magnifica*). Paradisea magnifica, Linn.; le Magnifique of Buffon. This beautiful bird is of an orange-chestnut above, deeper on the top of the head and back, and sometimes inclining to purple; the tips of the wings and the tail are brown; the throat is blackish, with a purple gloss; the breast and under parts are covered with scale-shaped feathers of a deep changeable golden green, with a blue reflection down the breast. From the back of the neck springs a double ruff, composed of slender plumes, with slightly dilated extremities; the first series are short and orange-coloured, with a black spot at the end of each feather; the others are longer and pale yellow. The wing-coverts are orange-coloured, with transverse blackish crescents; from the tail-coverts spring two long slender shafts of golden green.

1559, 1560, 1561.—EMERALD BIRD OF PARADISE

(*Paradisea apoda*). Body above, breast, and abdomen, marroon brown; front covered with close-set feathers of a velvety-black, shot with emerald-green; top of the head and upper part of the neck citron-yellow; upper part of the throat golden green; front of the neck violet-brown; flanks adorned with bundles of very long plumes, with loose barbules of a yellowish-white, slightly spotted towards the extremity with purpled-red: these plumes extend far beyond the tail-feathers. Two long horny shafts, furnished with stiff hairs, take their rise on each side of the rump, and extend somewhat circularly to a length of nearly two feet. Beak horn-colour; feet lead-colour; length from the end of the beak to the extremity of the tail-feathers, thirteen inches.

Female.—Front and fore part of the neck of a deep marroon-brown; head, neck, and back reddish-yellow; wings and tail of a deep and brilliant marroon-colour; bellyand breast white; no floating plumes. (Fig. 1561.)

This species, which is not so common as the little emerald (Paradisea Papuensis, Latham), inhabits the islands of Arou, Tidor, and Wagiou, as well as New Guinea.

We owe the most modern account of these birds in a state of nature to M. Lesson, who, though he deeply laments his short stay at New Guinea (only thirteen days), appears to have made the best use of his time.

"The Birds of Paradise," says M. Lesson, "or at least the emerald (Paradisea apoda, Linn.), the only species concerning which we possess authentic intelligence, live in troops in the vast forests of the country of the Papuans, a group of islands situated under the equator, and which is composed of the islands Arou, Wagiou, and the great island called New Guinea. They are birds of passage, changing their quarters according to the monsoons. The females congregate in troops, assemble upon the tops of the highest trees in the forests, and all cry together to call the males. These last are always alone in the midst of some fifteen females, which compose their seraglio, after the manner of the gallinaceous birds.

"The Manucode presented itself twice in our shooting excursions, and we killed the male and female. This species would seem to be monogamous, or perhaps it is only separated into pairs at the period of laying. In the woods this bird has no brilliancy; its fine-coloured plumage is not discovered, and the tints of the female are dull. It loves to take its station on the teak-trees, whose ample foliage shelters it, and whose small fruit forms its nourishment. Its irides are brown, and the feet are of a delicate azure. The Papuans call it Saya.

"Soon after our arrival on this land of promise (New Guinea) for the naturalist, I was on a shooting excursion. Scarcely had I walked some hundred paces in those ancient forests, the daughters of time, whose sombre depth was perhaps the most magnificent and stately sight that I had ever seen, when a Bird of Paradise struck my view: it flew gracefully and in undulations; the feathers of its sides formed an elegant and aërial plume, which, without exaggeration, bore no remote resemblance to a brilliant meteor. Surprised, astounded, enjoying an inexpressible gratification, I devoured this splendid bird with my eyes; but my emotion was so great that I forgot to shoot at it, and did not recollect that I had a gun in my hand till it was far away.

"One can scarcely have a just idea of the Paradise-birds from the skins which the Papuans sell to the Malays, and which come to us in Europe. These people formerly hunted the birds to decorate the turbans of their chiefs. They call them Mambéfore in their tongue, and kill them during the night by climbing the trees where they perch, and shooting them with arrows made for the purpose, and very short, which they make with the stem of the leaves of a palm (latanier). The Campongs or villages of Mappia and of Emberbakène are celebrated for the quantity of birds which they prepare, and all the art of their inhabitants is directed to taking off the feet, skinning, thrusting a little stick through the body, and drying it in the smoke. Some, more adroit, at the solicitation of the Chinese merchants, dry them with the feet on. The price of a Bird of Paradise among the Papuans of the coast is a piastre at least. We killed, during our stay at New Guinea, a score of these birds, which I prepared for the most part. . . .

"The emerald, when alive, is of the size of the common jay: its feet and beak are bluish; the irides are of a brilliant yellow; its motions are lively and agile; and in general, it never perches except upon the summit of the most lofty trees. When it descends, it is for the purpose of eating the fruits of the lesser trees, or when the sun in full power compels it to seek the shade. It has a fancy for certain trees, and makes the neighbourhood re-echo with its piercing voice. This cry indicated to us the movements of these birds. We were on the watch for them, and it was thus that we came to kill them; for when a male Bird of Paradise has perched, and hears a rustling in the stillness of the forest, he is silent and does not move. His call is *voike, voike, voike, voiko*, strongly articulated. The cry of the female is the same, but she raises it much more feebly. The latter, deprived of the brilliant plumage of the male, is clad in sombre attire. We met with them assembled in scores, on every tree, while the males, always solitary, appeared but rarely.

"It is at the rising and setting of the sun that the Bird of Paradise goes to seek its food. In the middle of the day it remains hidden under the ample foliage of the teak-tree, and comes not forth. It seems to dread the scorching rays of the sun, and to be unwilling to expose itself to the attacks of a rival. . . . .

"In order to shoot Birds of Paradise, travellers who visit New Guinea should remember that it is necessary to leave the ship early in the morning, to arrive at the foot of a teak-tree or fig-tree, which these birds frequent for the sake of the fruit—(our stay was from the 26th of July to the 9th of August)—before half-past four, and to remain motionless till some of the males, urged by hunger, light upon the branches within range. It is indispensably requisite to have a gun which will carry very far with effect, and that the grains of shot should be large; for it is very difficult to kill an emerald outright, and if he be only wounded it is very seldom that he is not lost in thickets so dense that there is no finding the way without a compass.

"The little emerald Paradise-bird (Paradisea Papuensis) feeds, without doubt, on many substances in a state of liberty. I can affirm that it lives on the seeds of the teak-tree, and on a fruit called amihou, of a rosy white, insipid and mucilaginous, of the size of a small European fig, and which belongs to a tree of the genus Ficus."

M. Lesson then goes on to state that he saw two Birds of Paradise which had been kept in a cage for more than six months by the principal Chinese merchant at Amboyna. They were always in motion, and were fed with boiled rice, but they had a special fondness for cockroaches (blattæ).

Bennett, in his 'Wanderings,' gives the following account of a Bird of Paradise (Paradisea apoda) which he found in Mr. Beale's aviary at Macao, where it had been confined nine years, exhibiting no appearance of age:—

"This elegant creature has a light, playful, and graceful manner, with an arch look; dances about when a visitor approaches the cage, and seems delighted at being made an object of admiration; its notes are very peculiar, resembling the cawing of the raven, but its tones are by far more varied. During four months of the year, from May to August, it moults. It washes itself regularly twice daily, and, after having performed its ablutions, throws its delicate feathers up nearly over the head, the quills of which feathers have a peculiar structure, so as to enable the bird to effect this object. Its food during confinement is boiled rice, mixed up with soft egg, together with plantains, and living insects of the grasshopper tribe; these insects, when thrown to him, the bird contrives to catch in his beak with great celerity: it will eat insects in a living state, but will not touch them when dead.

"I observed the bird, previously to eating a grasshopper given him in an entire or unmutilated state, place the insect upon the perch, keep it firmly fixed with the claws, and divesting it of the legs, wings, &c., devour it, with the head always placed first. The servant who attends upon him to clean the cage, give him food, &c., strips off the legs, wings, &c., of the insects when alive, giving them to the bird as fast as he can devour them. It rarely alights upon the ground, and so proud is the creature of its elegant dress, that it never permits a soil to remain upon it, and it may frequently be seen spreading out its wings and feathers, and regarding its splendid self in every direction, to observe whether the whole of its plumage is in an unsullied condition. It does not suffer from the cold weather during the winter season at Macao, though exposing the elegant bird to the bleak northerly wind is always very particularly avoided. . . . .

"The sounds uttered by this bird are very peculiar; that which appears to be a note of congratulation resembles somewhat the cawing of a raven, but changes to a varied scale of musical gradations, as *he, hi, ho, haw*, repeated rapidly and frequently, as lively and playfully he hops round and along his perch, descending to the second perch to be admired, and congratulate the stranger who has made a visit to inspect him; he frequently raises his voice, sending forth notes of such power as to be heard at a long distance, and as it could scarcely be supposed so delicate a bird could utter; these notes are *whock, whock, whock, whock*, uttered in a barking tone, the last being given in a low tone as a conclusion.

"A drawing of the bird, of the natural size, was made by a Chinese artist. The bird advanced steadfastly towards the picture, uttering at the same time its cawing congratulatory notes; it did not appear excited by rage, but pecked gently at the representation, jumping about the perch, knocking its mandibles together with a clattering noise and cleaning them against the perch, as if welcoming the arrival of a companion. After the trial of the picture, a looking-glass was brought, to see what effect it would produce upon the bird, and the result was nearly the same; he regarded the reflection of himself most steadfastly in the mirror, never quitting it during the time it remained before him When the glass was removed to the lower from the upper perch he instantly followed, but would not descend upon the floor of the cage when it was placed so low. . . . .

"One of the best opportunities of seeing this splendid bird in all its beauty of action, as well as display of plumage, is early in the morning, when he makes his toilet; the beautiful subalar plumage is then thrown out, and cleaned from any spot that may sully its purity by being passed gently through the bill; the short chocolate-coloured wings are extended to the utmost, and as he keeps them in a steady, flapping motion, as if in imitation of their use in flight, at the same time raising up the delicate long feathers over the back, which are spread in a chaste and elegant manner, floating like films in the ambient air. . . . .

"I never yet beheld a soil on its feathers. After expanding the wings, it would bring them together so as to conceal the head, then bending it gracefully, it would inspect the state of its plumage underneath. This action it repeats in quick succession, uttering at the time its croaking notes; it then pecks and cleans its plumage in every part within reach, and throwing out the elegant and delicate tuft of feathers underneath the wings, seemingly with much care, and with not a little pride, they are cleaned in succession, if required, by throwing them abroad, elevating them, and passing them in succession through the bill. Then turning its back to the spectator, the actions above mentioned are repeated, but not in so careful a manner: elevating its tail and long shaft feathers, it raises the delicate plumage of a similar character to the subalar, forming a beautiful dorsal crest, and, throwing its feathers up with much grace, appears as proud as a lady dressed in her full ball-dress. Having completed the toilet, he utters the usual cawing notes, at the same time looking archly at the spectators, as if ready to receive all the admiration that it considers its elegant form and display of plumage demands; it then takes exercise by hopping, in a rapid but graceful manner, from one end of the upper perch to the other, and descends suddenly upon the second perch, close to the bars of the cage, looking out for the grasshoppers which it is accustomed to receive at the time. . . . .

"His prehensile power in the feet is very strong, and, still retaining his hold, the bird will turn himself round upon the perch. He delights to be sheltered from the glare of the sun, as that luminary is a great source of annoyance to him if permitted to dart its fervant rays directly upon the cage. The iris, frequently expanding and contracting, adds to the arch look of this animated bird, as he throws the head on one side to glance at visitors, uttering the cawing notes or barking loud. . . . Having concluded, he jumps down to the lower perch in search of donations of living grasshoppers.

"The bird is not at all ravenous in its habits of feeding, but it eats rice leisurely, almost grain by grain. Should any of the insects thrown into his

8 —Magnificent Bird of Paradise,

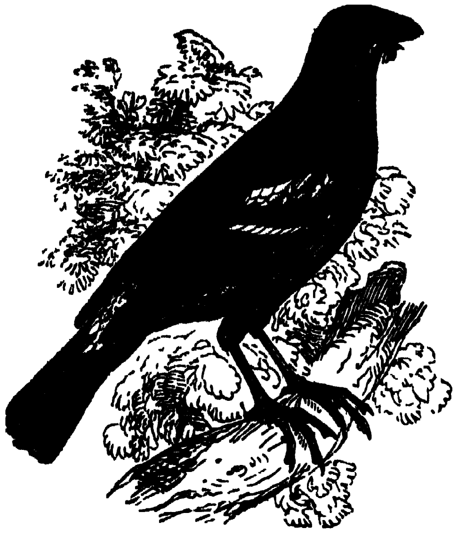
1557 —Golden Bird of Paradise.

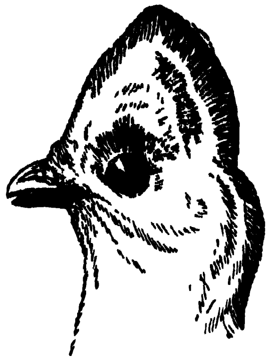
1561.—Emerald Bird of Paradise: Female.

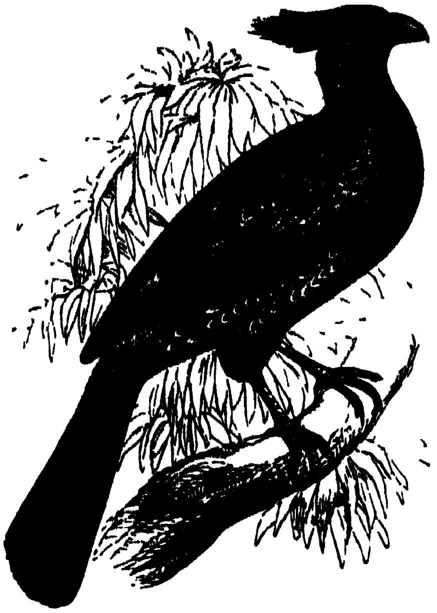
-Emerald Bird of Pa

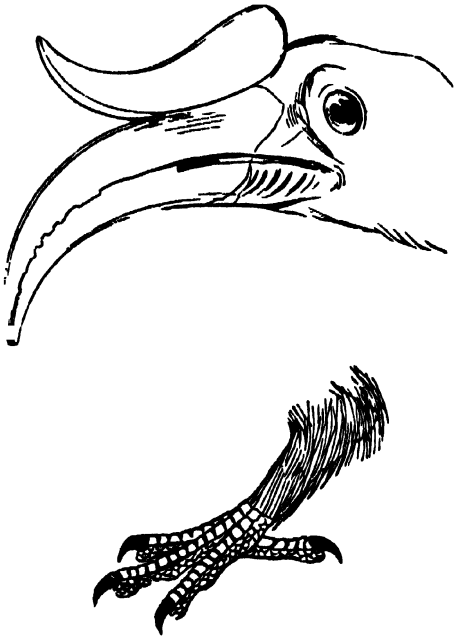
1560.—Emerald Bird of Paradise.

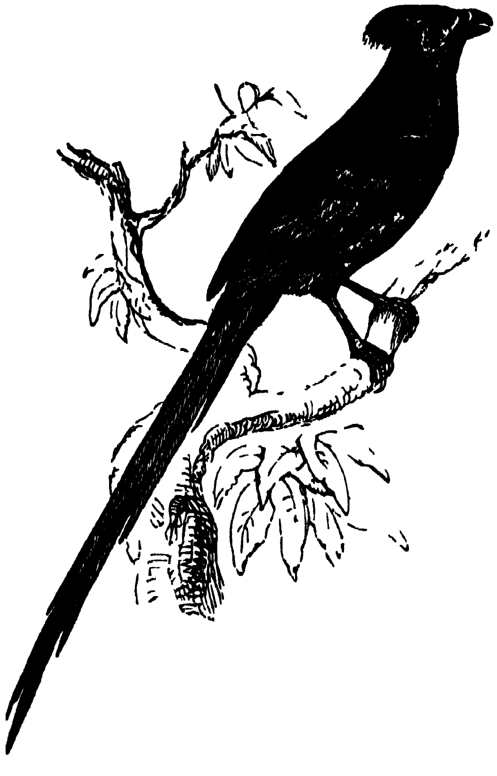
562.—Birds of Paradise.

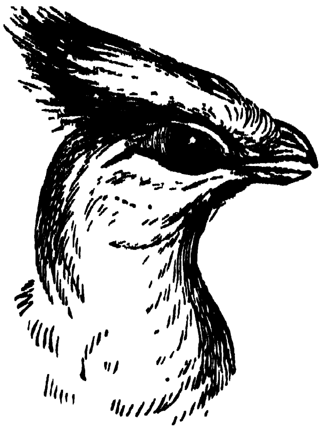

1563.—Chilian Plant cutter

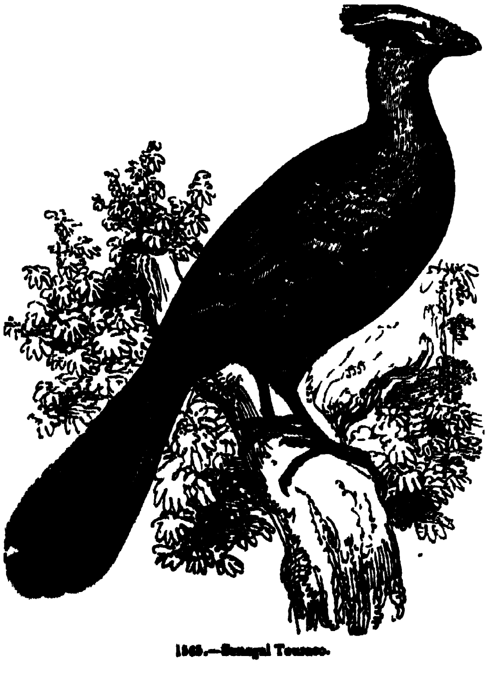

1568.—Head of Fire-crested Touraco

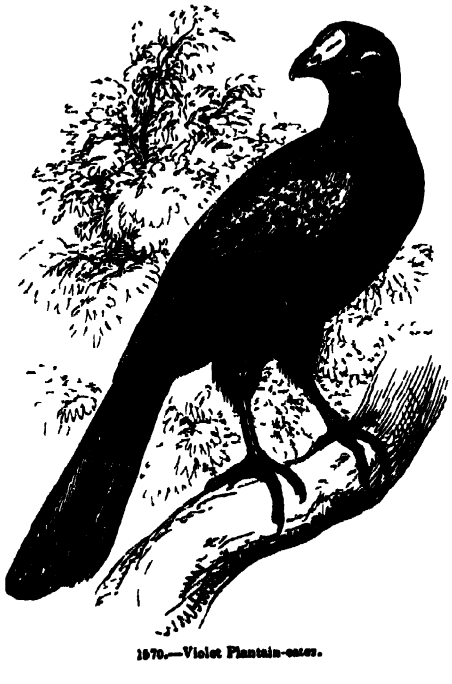

1569.—Variegated Touraco.

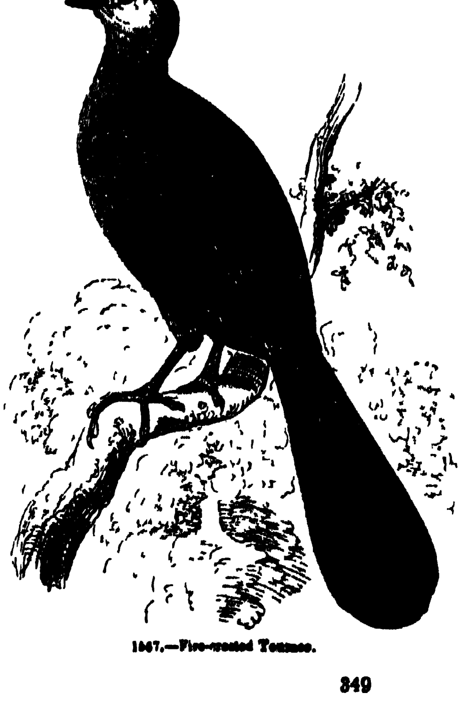

1571.—Head and Foot of Rhinoceros Hornbill.


1564.—Senegal Coly.


1566.—Head of Senegal Touraco

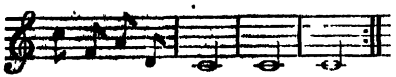

1565.—Senegal Touraco.


1570.—Violet Plantain-eater.


1567.—Fire-crested Touraco.

'cage fall upon the floor, he will not descend to them, appearing to be fearful that in so doing he should soil his delicate plumage; he therefore seldom or never descends, except to perform his ablutions in the pan of water placed at the bottom of the cage expressly for his use."

In the 'Proceeds. Zool. Soc.,' 1840, p. 13, will be found an account of the same individual by Mr. G. T. Lay, which embodies the same facts as those detailed by Mr. Bennett, excepting that he explains more clearly the song or "serenade" of the bird, the notes of which are repeated in harmonic progression, thus:—



"The first four notes are very exactly intonated, very clear, and very sweet; the last three are repeated in a kind of caw, a very high refinement of the voice of a daw or a crow, yet possessing a striking resemblance; and this suggests a lively affinity between the crows and the Paradise-birds; while this serenade is uttered, the black pupil, encircled by a golden iris, waxes or wanes as the creature wishes to contemplate more distinct or nearer objects."

Fig. 1562 represents a group of Birds of Paradise: *a*, the Emerald; *b*, the Golden; *c*, the Incomparable; *d*, the Cloudy; *e*, the Superb.

Family PHYTOTOMIDÆ (PLANT-CUTTERS).

Some ornithologists place the Plant-Cutters, the Colies, the Touracos, and Plantain-eaters under one family head, of which they constitute so many distinct tribes; we are inclined, however, to regard them as the types of distinct forms, that is, constituting so many family sections; and this appears to be the opinion of Mr. G. Gray, excepting that he considers the Plant-cutters to be one of the tribes composing the extensive family of the Fringillidæ.

Mr. Swainson characterizes the Plant-cutters as having the bill serrated, but not swollen, and the feet with two or with three anterior toes, and one backward. In the genus Hireus the toes are only three. In size and aspect he compares these birds to the bullfinches. The species are limited in number.

1563.—The Chilian Plant-Cutter

(*Phytotoma rara*). It is to Molina that we are principally indebted for our knowledge of the habits of this bird, which, from the depredations it commits, is subject to incessant persecution. It feeds on plants of the most tender nature, cutting them off close to the root; and, not content with merely satisfying its appetite, it has the destructive habit of cropping close a quantity of them without touching them further; thus injuring the fields of rising grain while the blade is peeping above the surface.

The Chilian Plant-cutter builds its nest on the most lofty trees, in obscure and but little frequented spots, and, consequently, generally rears its brood in safety, notwithstanding the reward which Molina says is (or in his time was) given to children and other persons who destroy the eggs.

The same writer states that its numbers were in his time considerably diminished, and adds, "I do not know whether this circumstance is because a price is set on its head, or on account of its naturally small degree of fecundity."

In size this bird nearly equals a thrush; its bill is rather large, straight, conical, and with the edges serrated; the tail is moderate and rounded. The colour is dusky-grey upon the back, rather clearer on the under surface; the points of the quills and the tail are black. Its voice is a hoarse, interrupted note.

Family COLIADÆ (THE COLIES).

These birds, the Oiseaux-Souris, or Mouse-Birds, of Le Vaillant, so called from their sombre colours, soft and silky plumage, and mode of creeping about the branches, are natives of Africa and India. They are gregarious in their habits, and infest gardens and cultivated spots for the sake of fruits, upon which they subsist. It is seldom that they are seen upon the ground; like titmice, they climb about the branches, clinging in every attitude, and assisting themselves with the beak in the manner of parrakeets. They build their nests, which are spacious and round, in little groups, and, as Le Vaillant states, sleep suspended with their heads downwards, and that when it is cold, they are found so benumbed in the morning that they may be taken one after the other. Their flesh is delicate. The females lay five or six eggs.

1564.—The Senegal Coly

(*Colius Senegalensis*, Latham). Bill short, conical, slightly compressed, with the upper mandible somewhat arched, and the edges of both serrated; wings long; tail very long and graduated; feet well formed for clinging; the eye is surrounded by a naked reddish skin; the general plumage is pearl-grey with greenish reflexions, excepting the forehead, which is yellow, and the abdomen, which is ruddy.

Family MUSOPHAGIDÆ (PLANTAIN-EATERS).

This family contains the genera Corythaix, Chizærhis, and Musophaga. In these genera the bill is serrated, and the outer of the anterior toes capable of being directed obliquely backwards.

The genus Corythaix is thus characterized:—Bill short, high and greatly compressed, with the ridge arched; head crested, the frontal feathers reposing over the nostrils; wings short and rounded; tail long, broad, and rounded; feet strong; claws short; plumage lustrous and silky. The Touracos are most beautiful birds; and feed principally on soft fruits, displaying great address among the branches of the trees. They are natives of Africa, and tenant the forests, perching on the highest branches, often out of the reach of gunshot: their voice is sonorous. They breed, like Toucans, in hollow trees. In captivity, judging from the individuals we have personally seen, they are very gentle and soon become familiar. Their size exceeds that of our common jay; the prevailing colour of the plumage is green, diversified with violet, purple, and red. In the 'Proceeds. Zool, Soc.,' 1834, p. 3, will be found an account of the anatomy of the Corythaix porphyreolopha, by Professor Owen, and in the 'Proceeds.' for 1836, p. 32, our account of the dissection of the Corythaix Buffonii.

1565.—The Senegal Touraco

(*Corythaix Senegalensis*). In this species the crest consists of long silky feathers which sweep backwards over the top of the head; when, however, the bird is excited, the crest is elevated, and assumes a compressed subconical shape, giving to the head a helmeted appearance. Fig. 1566 represents the head of this species, and well displays the form of the beak, the extent of naked skin around the eye, and the arrangement of the plumes of the crest.

1567.—The Fire-crested Touraco

(*Corythaix erythrolophus*). C. igniceps, Lesson; Musophaga Paulina, Temminck. In this species the silky crest is erect, compressed, and of a red colour; the sides of the head and throat are white; the general plumage is green, inclining to bluish on the under parts; the quill-feathers are rich purple-violet; the bill is yellow; the feet dusky; eyes large, red, and brilliant. Fig. 1568 represents the head, which may be compared with that of the Senegal Touraco,

In the 'Proceeds. Zool. Soc,' June 14, 1831, is the description of the C. porphyreolopha, Vigors; and in the 'Proceeds.' for 1839, p. 34, the description of a new species, the C. macrorhynchus, Fraser.

It was in pursuit, we believe, of the Corythaix Buffonii that Le Vaillant met with an accident that might have terminated the enthusiastic traveller's adventures. Having succeeded in bringing a touraco to the ground from its lofty perch, he could not immediately find it, and stamping in his vexation at the loss, little aware of what was beneath him, broke through into one of the covered pits which the Hottentots dig for the purpose of catching buffaloes, elephants, &c.

1569.—The Variegated Touraco

(*Chizærhis variegata*). Touraco huppeé-col of Le Vaillant; Phasianus Africanus, Latham; Musophaga variegata, Vieillot.

The genus Chizærhis differs from Corythaix in the greater size and sharpness of the bill, in the lengthened form of the wings, and in the nostrils being unobscured by feathers; habits, those of the Touracos in general. The present bird is a native of Africa. Its colour is light grey above, a blackish stripe down each feather; top of the head and throat as far as the breast chestnut-brown; under plumage beyond the breast white, each feather having a dark central stripe; quill-feathers blackish, with a spot of pure white, varying in size at the middle of the inner webs; tertiaries and middle tail-feathers grey, tipped with black; lateral feathers black; bill yellow; legs grey; crest placed on the back of the head. Total length twenty inches.

1570.—The Violet Plantain-Eater

(*Musophaga violacea*). In this genus the bill resembles that of Chizærhis, but the base enormously dilated so as to spread like a casque or helmet over the fore part of the head as far as the crown, where its thickened sides form a semicircle; nostrils naked, oval, open, and pierced in the middle of the bill; wings, feet, and tail, as in Corythaix

This richly-coloured and magnificent bird is a native of the Gold Coast and Senegal. Its description is as follows:—Bill rich yellow passing into crimson orbits and crimson; feathers of the crown close and fine, and of a rich crimson; a white mark beginning below the eye extends above the ear; secondary and part of the primary quills carmine, with lilac reflexions margined and tipped with blackish violet, which is the general colour of the plumage, only that it changes to a very deep green on the under parts, and is very rich on the tail; legs strong and black.

Family BUCERIDÆ (HORNBILLS).

These strange-looking birds, characterizd by the enormous development of the beak, are natives of India and Africa. Not only is the beak of immense magnitude, but the upper mandible is furnished with projecting appendages, adding greatly to its entire dimensions, and in some species encroaching over the top of the head. These appendages increase with age; in young birds they are very small, and their figure is undefined, and it is gradually that they acquire their enormous dimensions. The immense beak, thus furnished, seems to be heavier than it is (and it is by no means light), for the additional appendage is cellular internally; the edges of both mandibles are roughly notched. The structure of the toes and the shortness of the tarsi of the Hornbills indicate arboreal habits. The middle and outer toes are united as far as the second joint, and the under surface of the whole is flat and palm-like in order to give a firm close hold upon the branch (see Fig. 1571, the head and foot of Buceros Rhinoceros; and Fig. 1572, a section of the skull). In their food these birds appear to be omnivorous, fruits, eggs, young birds, reptiles, and even carrion forming their diet. Of the fruit of the Ficus Indica and of the Banyan, they are said to be very fond, and also, according to Bontius, of nutmegs, which impart an aromatic flavour to the flesh, which is delicate: this account applies more exclusively to the Buceros Hydrocorax, Linnæus; for respecting the Buceros Rhinoceros he says, "It lives on the carcasses and intestines of animals, and waits upon the hunters who kill wild cattle, boars, and stags, to gorge itself with the entrails of the slain beasts."

M. Lesson sums up the habits of the Hornbills thus:—Those of Africa live on carrion: those of the East Indies seek for fruits, especially nutmegs, and their flesh thence acquires a delicious flavour. Their flight is performed by repeated strokes of the wings, and the air which they displace, joined to the clattering of their mandibles, occasions a great and very disquieting noise in the forests, when the cause is unknown. This noise, capable of inspiring terror, does not ill resemble those flaws of rough and sudden winds ("grains de vent brusques et subits") which arise so unexpectedly between the tropics, and blow so violently. The Europeans established at the Moluccas think that the furrows which are seen on the bill of the Hornbills are the result of age, and that each furrow signifies a year; whence the name of Jerarvogel, which they give to these birds. Mr. Swainson remarks that the Hornbills are gregarious noisy birds, generally of a very large size, and are restricted to the Old World; that they are omnivorous, feeding both on animals and vegetables; that some, however, seem only to partake of the latter food; while others, upon the authority of Le Vaillant, feed upon carrion. The Buceros cavatus dissected by Mr. Owen was observed to be more attached to animal than to vegetable food, and would quit any other substance if a dead mouse was offered to it. This it would swallow entire, after squeezing it twice or thrice with the bill; and no castings were noticed. Mr. Owen, however, adds that Petiver has borne testimony to its regurgitating habits.

The progressive motion of these birds on the ground is by hopping or jumping along. Major-General Hardwicke expresses surprise at this, and at their perching with such security, as their feet are formed for walking, and better suited to the ground than the trees; an error which a consideration of the form and shortness of the tarsi, the structure of the toes, and the general contour of the birds might, one would think, have prevented.

Active and alert, notwithstanding the magnitude of their beaks, these birds lightly traverse the branches of the forest, and leap from one to another till the highest is attained: they then often stop and utter a loud roaring sound, which may be heard at a considerable distance, and is alarming to those who do not know whence it proceeds. The noise thus uttered, and which is most probably their call-note, throws a light upon the design of the hollow protuberance surmounting the bill; it acts as a sounding-board, increasing the reverberation of the air. With regard to the huge beak itself, many conjectures have been entertained as to its peculiar size. It has been suggested as a reason for its development, that it perhaps constitutes a necessary weapon of defence against monkeys, and other animals which may seek to assail its nest; while some have supposed that it might be employed in dragging snakes and lizards from their lurking-places, or young birds and eggs from the recesses of the trunks of aged trees. The tongue is short, triangular, and smooth. For an account of the anatomy of the hornbill, see 'Proceedings of the Zoological Society,' 1833, p. 102, et seq.

1573.—The Rhinoceros Hornbill

(*Buceros Rhinoceros*). This species is a native of India and the Indian Islands, and is to be seen in most museums, specimens being often brought to Europe. Though there may be some variety from age and circumstances, the bill will be generally found to be about ten inches long and of a yellowish-white; the upper mandible red at the base, the lower black. The horn, or casque, varied with black and white. The body black, of a dirty white below and posteriorly, tail about twelve inches, the feathers white at the base and tip, black in the middle; feet and claws obscure grey The feathers of the cheeks and back of the neck are loose and hair-like.

1574.—The Concave Hornbill

(*Buceros cavatus*). This large species is a native of India, the Himalaya range, Java, and most of the islands in the Indian Archipelago It is figured in the 'Century' by Mr. Gould, who thus describes it —"Throat, ear-coverts, circle round the eye, and a narrow band at the occipital edge of the protuberance of the beak, black, neck dirty straw-colour, the feathers of the back of the neck elongated; the body and wings black, greater coverts and quill feathers tipped with white; thighs, upper and under tail-coverts, white, as is the tail also, with the exception of a broad black band about three inches from the tip; beak yellowish, inclining to scarlet at the tip; under mandible black at the base; tarsi black. The food of the Buceros cavatus, like that of other hornbills, consists of fruits, berries, flesh, and even carrion, in short, it may be considered as strictly omnivorous" (Gould)

We may add that this and the other species have the habit of throwing their food up in the air with a jerk, and dexterously catching it, when they swallow it at once.

Family UPUPIDÆ (HOOPOES)

This limited family group has been a sort of stumbling-block to ornithologists, who have differed widely as to its affinities, and consequently its situation in a natural arrangement Linnæus placed the Hoopoe near the Bee-eaters, Meyer, between the Orioles and Cuckoos; Vieillot, Vigors, and Swainson, in the same group with the Promerops; the Prince of Canino assigns it a place between the Kingfisher and Humming-birds. For ourselves we are strongly inclined to believe that the Hoopoe is very nearly allied to the great birds just noticed, viz, the Hornbills, and such, we believe, is the opinion of Mr. Gould. There is much in form, food, and habits in which they agree; the beak in the Hoopoe, it is true, is slender and elongated, arched, triangular, and destitute of appendages, but it is used in the same manner and for the same purposes as that of the Hornbill, namely, for seizing food, as insects, squeezing them to death, and throwing them with a jerk into the throat The bill, moreover, is short and nearly straight, with a cylindrical point in the young, and gradually acquires its full development, which is in fact that of horn continued in extension far beyond the true osseous mandibles (See Fig 1575, Head of Hoopoe.) The tongue is short and triquetral, the feet, from the increased length of the hind toe and size of the nail, are better adapted for terrestrial progression, but the middle and outer toes are united as far as the first joint In the general contour, and in the arrangement of the markings of the plumage, we may detect a resemblance to the Hornbills, as also in their mode of nidification, namely, in the hollows of decayed trees Without, however, insisting on this point, or entering into a disquisition foreign to our present design, let us at once proceed to give some account of the economy of the Hoopoes, of which three species are recognised—one African, another Indian, a third almost universally spread, being found in Europe, India, China, and other parts of Asia, and in Africa.

1576, 1577, 1578.—The Hoopoe

(*Upupa Epops*, Linn.). This is the ἔποψ (Epops) of the Greeks (Aristot., 'Hist. Anim,' i. 1; ix 11, ix. 15, 49; Aristoph., 'Birds,' 228, et seq; Pausanias, x. 4); Upupa and Epops of the ancient Italians (Pliny, 'Nat. Hist.,' x. 29; xxx. 6; Ovid, 'Metam., vi.). It is the Buba, Upega, Gallo del Paradiso, Galleto de magio, Pubula, Bubbola, Pupita, and Upupa of the modern Italians; Hupe, Huppe, Putput, Huput, and Lupoge of the French; el Abubilla of the Spanish; Wiedehopf of the Germans; de Hoppe of the Netherlanders; Haziogel of the Swedes; Her-fugl of the Danes; Smerda Kaura of Scopoli; Dung bird and Hoopoe of the modern British; y Goppog of the ancient British.

The Hoopoe is a bird of migratory habits, extending as far north in the summer as Denmark, Sweden, and Russia. It is common in many parts of Germany, Holland, France, and Spain; but is, comparatively speaking, a rare visitor to our island, though instances have been known of its having bred in this country, and more undoubtedly would occur, did not the appearance of a pair of these birds call up incessant attempts at their destruction. Gilbert White, in his 'History of Selborne' (letter xi), instances a pair of Hoopoes which one summer visited his premises, frequenting for some weeks an ornamented piece of ground adjoining the garden "They used to march about in a stately manner, feeding in the walks many times in the day, and seemed disposed to breed in my outlet, but were frightened and persecuted by idle boys, who would never let them be at rest" The Hoopoe affects moist and low situations, in the neighbourhood of woods and thickets, where it finds suitable food

Pliny has noticed this species as "obscæna pastu avis," and Pennant, after stating that it breeds in hollow trees, and feeds on insects, adds that the ancients believed that it made its nest of the most disgusting materials, so far is certain, that its hole is excessively fœtid from the tainted food it brings to its young

In the 'Magazine of Natural History' it is stated that on the Bordeaux side of the Garonne and near the city are large spaces of marshy ground intersected by broad ditches and creeks terminating in the river, where poplars and willows are planted for the sake of their twigs used for tying the vines These trees being topped become very stout, and as they decay at the centre in a few years, they are attacked by numerous insects, particularly the Formica fuliginosa Here the Hoopoes are frequently seen examining the rotten wood, and feeding on the insects which abound therein. It is further remarked, that the Hoopoe flies low, and seldom, unless disturbed, its food being so abundant as to require but little search, and that it breeds in a hollow willow about the end of May, the young coming out in June

Indeed they breed, generally, in hollow trees, and, notwithstanding the accounts of the disgusting materials which they were said to use, noticed by Aristotle and other writers, form a nest of a few dried grass-stalks and feathers, laying eggs varying from four to seven in number, of a pale lavender-grey, about an inch and a half long and about eight lines broad

In a state of nature the Hoopoe is much upon the ground during the day, generally in moist situations, where it may meet with its insect food Bechstein gives the following interesting account, written by M. von Schauroth, in his 'Cage-Birds. "With great care and attention I was able last summer to rear two young hoopoes, taken from a nest which was placed at the top of an oak-tree These little birds followed me everywhere, and when they heard me at a distance, showed their joy by a particular chirping, jumped into the air, or, as soon as I was seated, climbed upon my clothes, particularly when giving them their food from a pan of milk, the cream of which they swallowed greedily; they climbed higher and higher, till at last they perched on my shoulders, and sometimes on my head, caressing me very affectionately notwithstanding this, I had only to speak a word to rid myself of their company; they would then immediately retire to the stove. Generally, they would observe my eyes to discover what my temper might be, that they might act accordingly I fed them like the nightingales, or with the universal paste, to which I sometimes added insects: they would never touch earth-worms, but were very fond of beetles and May-bugs these they first killed, and then beat them with their beak into a kind of oblong ball, when this was done, they threw it into the air, that they might catch it and swallow it lengthwise, if it fell across the throat, they were obliged to begin again Instead of bathing, they roll in the sand. I took them one day into a neighbouring field, that they might catch insects for themselves, and had then an opportunity of remarking their innate fear of birds of prey, and their instinct under it. As soon as they perceived a raven, or even a pigeon, they were on their bellies in the twinkling of an eye, their wings stretched out by the side of their head, so that the large quill-feathers touched; they were thus surrounded by a sort of crown, formed by the feathers of the tail and wings, the head leaning on the back with the bill pointing upwards; in this curious posture they might be taken for an old rag. As soon as the bird which frightened them was gone, they jumped up immediately, uttering cries of joy. They were very fond of lying in the sun; they showed their content by repeating in a quivering tone, *vec, vec, vec*; when angry, their notes are harsh, and the male, which is known by its colour being redder, cries *hoop, hoop*. The female had the trick of dragging its food about the room: by this means it was covered with small feathers and other rubbish, which by degrees formed into an indigestible ball in its stomach, about the size of a nut, of which it died. The male lived through the winter; but not quitting the heated stove, its beak became so dry that the two parts separated, and remained more than an inch apart: thus it died miserably."

Mr Yarrell has recorded the manners of a Hoopoe in the possession of Mr. Bartlett, the preserver of birds, in Museum Street. "This bird," says Mr. Yarrell, "is quite tame, and, when unexcited, the high crest falls flat over the top of the head and covers the occiput; it takes a meal-worm from the hand very readily, nibbles and pinches it between the ends of the mandibles, then putting it on the ground, strikes it several blows with the point of the beak, when the insect is apparently dead, or disabled, it is again taken up, and by a particular motion of the head, which is thrown backward, and the beak open, the meal-worm drops into the gape of the mouth and is swallowed, The call for another is a sharp note, but it also utters at times a sound closely resembling the word *hoop, hoop, hoop*, but breathed out so softly, yet rapidly, as to remind the hearer of the note of the dove. This bird constantly rubs himself in the sand with which the bottom of his large cage is supplied, dusting himself like the larks, but takes great care to shake off any sand or gravel that may adhere to his food, which is raw meat, chopped, and boiled egg He hides superfluous food, and resorts to his hoard when hungry When allowed to come out of his cage, he takes short flights about the room; but would not be considered a bird of great power upon the wing, yet the Bishop of Norwich has recorded that 'one approached a vessel in the middle of the Atlantic, and kept company with it a good way, but did not settle on board, which it probably would have done had it been tired.'

"At the moment of settling on the floor of the room, Mr. Bartlett's bird bends the head downwards till the point of the beak touches the floor, after which, as well as occasionally at other times, the long feathers forming the crest are alternately elevated and depressed in a slow and graceful manner, the bird assuming an appearance of great vivacity, running on the ground with a very quick step. M. Necker, in his 'Memoir on the Birds of Geneva,' says hoopoes fight desperately, and leave the ground covered with their feathers." ('British Birds')

The country-people of Sweden look on the appearance of this bird as a presage of war—

————'Facies armata videtur'*

and formerly the vulgar in our country esteemed it a forerunner of some calamity... The Turks call it Tir Chaous, or the messenger-bird, from the resemblance its crest has to the plumes worn by the Chaous, or Turkish couriers.

The male Hoopoe in full plumage may be thus described —Head beautifully crested, two parallel rows of long feathers form an arched crest, extending from the base of the beak to the occiput, these feathers are of a ruddy buff colour, terminated with black head, neck, and breast vinous buff; upper part of the back vinous grey, on the back a large transversal band, wings and tail black, on the wings are five transversal bands of yellowish white, and on the tail is a very large white band, about the middle of the feathers, at about three fourths of the length of the quills is a large white band, abdomen white, with some longitudinal spots on the thighs, bill flesh-colour at its base and black towards the point, feet and iris brown Length twelve inches and a half. Tail-feathers only ten in number.

Female less than the male, her crest shorter, and the tints of her plumage less vivid.

The young when they leave the nest have the bill short, nearly straight, and slightly cylindrical towards the point, the feathers of the crest short and often terminated with black, without the white spot which is immediately below it in the adult; the white band of the tail nearer to the rump, the plumage washed, as it were, with ash-colour; the bands on the wings less distinct and more yellowish, and a greater quantity of longitudinal spots upon the belly and thighs

---

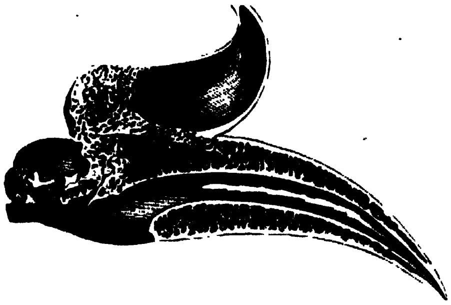
* Ovid well describes the hoopoe, into which, according to the fable Tereus was transformed (*Metam* lib. vi) —

"Tereus
Vertitur in volucrem; cui stant in vertice cristæ
Prominet immodicum pro longâ cuspide rostrum.
Nomen Epops volucri facies armata videtur."

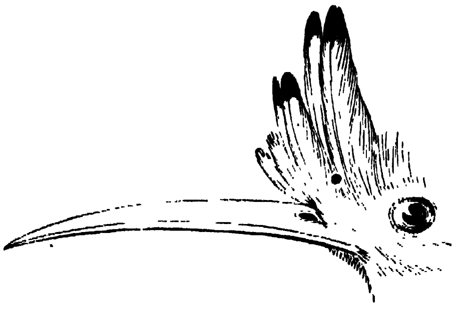
1573.—Rhinoceros Hornbill.

1574.—Concave Hornbill.

1576.—Hoopoe.



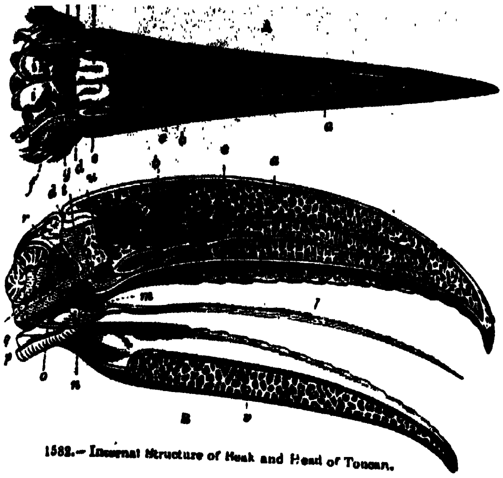
1572.—Section of Head of Rhinoceros Hornbill.



1575.—Head of Hoopoe.

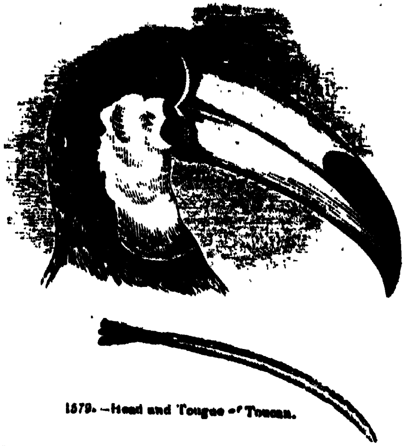
1578.—Hoopoes.

1577.—Hoopoe.



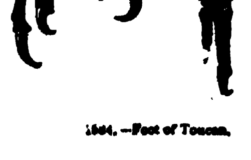
1582.—Internal Structure of Beak and Head of Toucan.

1580.—Head of Toucan.



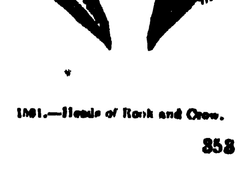
1579.—Head and Tongue of Toucan.

1585.—Group of Toucans.



1584.—Feet of Toucan.

1583.—Upper surface of Toucan's Tongue



1581.—Heads of Rook and Crow.

ORDER SCANSORES.

The order Scansores (les Grimpeurs, Cuvier) comprehends, in most systems of arrangement, all those birds which have the toes in pairs, two directed forwards, and two backwards, the outermost of the three anterior being altered as to its position, and brought to assist the true hind toe in its action. Consequently the Trogons and the Parrots are usually included in this order, but we conceive the former, notwithstanding their zygodactyle feet, to belong to the fissirostral birds, and the latter to compose an order *per se*. Mr. G. R. Gray, in his 'System of Birds,' regards the order Scansores as consisting of the Toucans, the Parrots, the Woodpeckers, and the Cuckoos; four families differing essentially from each other in habits and manners. To ourselves it appears that the order is altogether artificial; it is founded only on one character, irrespective of general form, food, and economy of life. We may add that this character (zygodactyle toes) is fallacious, for the foot of the woodpecker is utterly different in its structure both from that of the parrot and of the cuckoo.

If we compare the order Scansores, as at present established, with the order Natatores (swimming-birds), we shall at once perceive that the latter is natural, that the groups it contains are bound together by links of affinity more or less immediate; while in the Scansores we shall find groups that have nothing in common as respects structure and modes of existence, and hence do we feel that their collocation is not truly natural. If the parrots, as is undoubtedly the case, constitute an order *per se*, on the same grounds do the woodpeckers, and perhaps also the cuckoos. As, however, the settlement of questions such as these is not the object of our work, we shall at once proceed to the investition of our pictorial specimens.

Family RAMPHASTIDÆ (TOUCANS AND ARAÇARIS).

These richly-coloured birds are at once remarkable for the magnitude and figure of the bill, which was known in Europe before the birds themselves. Belon (A.D. 1555), in the 28th chapter of the third book 'De la nature des Oyseaux vivants le long des rivières ayant le pied plat, nommez en Latin *Palmipedes aves*,' gives a figure of the bill of the Toco Toucan, which he describes as belonging to a bird of the new world (terres neufues), and as being half a foot in length; pointed and black at the tip; white elsewhere; slightly notched along the edges; hollow within; and so finely delicate that it is thin and transparent as parchment; its beauty, he observes, has caused it to be kept in the cabinets of the curious. He further observes that he has not seen the bird itself, but suspects it to be one of those "de pied plat," and therefore places it among the river-birds. The same writer, in the 'Portraits d'Oyseaux,' again figures the bill as belonging to a water-bird with this description: "Bec d'un oyseau aquatique, apporté des terres neufues." Belon's error may be readily pardoned: such a beak as that of the Toucan, seen for the first time when ornithology was not a science, would puzzle any naturalist.

For upwards of a century after the date of Belon's works it does not appear that the birds themselves had found their way to England; the beak, however, of one species was in the collection of John Tradescant, and was described in the 'Museum Tradescantium' as that of the Araçari of Brazil (A.D. 1656), and it is probable that Tradescant had acquired correct information concerning the nature of the bird to which it belonged, if indeed he had not seen a specimen. Petiver (1702) gives a figure of the Toucan, which though rude, as were all the engravings of objects of natural history at that day, is substantially correct, even to the arrangement of the toes.

Willughby figures the Toucan (Rhamphastos Toco?) under the name of the Brazilian Pie of Aldrovandus, the Toucan of Marcgrave and others, the Xochitenacatl of the Mexicans. In this figure the toes are incorrect, owing to a mistake of the artist, for Willughby was evidently aware of their zygodactyle character.

The beak of the Toucan (Figs. 1579 and 1580) is, as Belon well observed, of large size, with serrated margins, but of light structure, being cancellous within. Its proportionate size to the head may be appreciated by comparing it with the beaks of other birds which have this organ well developed, as the rook and crow (Fig. 1581).

The osseous portions of the mandibles, observes Professor Owen, are disposed in a manner adapted to combine with the great bulk of those parts a due degree of strength, and remarkable lightness; consequently the bony structure is of the most beautiful and delicate kind. "The external parietes are extremely thin, especially in the upper mandible; they are elastic, and yield in a slight degree to moderate pressure, but present considerable resistance if a force is applied for the purpose of crushing the back. At the points of the mandibles the outer walls are nearly a line in thickness, at other parts in the upper mandible they are much thinner, varying from one-thirtieth to one-fiftieth of an inch in thickness; in the lower they are from one-twentieth to one-thirtieth of an inch in thickness. On making a longitudinal section of the upper mandible, its base is seen to include a conical cavity about two inches in length and one inch in diameter, with the apex directed forwards. The walls of this cone consist of a most beautiful osseous network intercepting irregular angular spaces, varying in diameter from half a line to two lines. From the parietes of this cone a network of bony fibres is continued to the outward parietes of the mandible, the fibres which immediately support the latter being almost invariably implanted at right angles to the part in which they are inserted. The whole of the mandible anterior to the cone is occupied with a similar network, the meshes of which are largest in the centre of the beak, in consequence of the union which takes place between different small fibres as they pass from the circumference inwards. It is remarkable that the principle of the cylinder is introduced into this elaborate structure; the smallest of the supporting pillars of the mandibles are seen to be hollow or tubular when examined with the microscope. The structure is the same in the lower mandible, but the fibres composing the network are in general stronger than those of the upper mandible." The nostrils are situated at the base of the upper mandible, where it rises above the level of the skull, and consequently they have a backward aspect, and are secured from any injury. The tongue is long, slender, flat, and horny, and furnished on each side with a series of short processes like the barbs of a feather. It is soft at its base.

Figure 1582 represents the structure of the head and beak of the Toucan, as investigated by Professor Owen: A, Section of the upper mandible of Ramphastos Toco. *a*, The cancellated structure of the beak; *b*, the cavity at the base; *c*, branches of the fifth pair of nerves; *d d*, external orifices of the nostrils; *e*, osseous parietes of the nasal passages; *f*, osseous tubes protecting the olfactory nerves; *g*, pituitary membrane exposed, and branches of the olfactory nerves radiating from it; *h*, superior semicircular canals of the internal ear; *i*, *i*, hemispheres of the cerebrum; *k*, the cerebellum. B, Vertical longitudinal section of the head. The same letters indicate the same parts as in the upper figure: *l*, the tongue; *m*, the glottis; *n*, the internal aperture to the nostrils; *o*, the os hyoides; *p*, the trachea; *q*, the œsophagus; *r*, the beginning of the spinal cord; *s*, articulating surface of occipital bone; *t*, the nasal septum or partition; *u*, the air-cell anterior to the orbit, from which the air passes into the mandible; *v*, the cancellated structure of the lower jaw.

Figure 1583 shows the upper surface of the tongue: *l*, the fringed or feathered portion; *m*, the orifice of the larynx, *n*, the orifice of the pharynx; *o*, cornua of os hyoides; *p*, trachea or windpipe; *q*, gullet. (Owen.)

Fig. 1584 conveys a clear idea of the zygodactylous arrangement of the toes in the birds of the present family.

Those who wish to enter minutely into the anatomy of the Toucan, we refer to Professor Owen's elaborate paper, in Mr. Gould's 'Rhamphastidæ.'

The Ramphastidæ are all natives of tropical America, where they live retired in the deep forests, mostly in small companies; their flight is straight but laborious, and while on the wing the beak is raised and directed forwards so as to offer as little resistance as possible to the air. Among the branches of the trees their movements are easy and active, they appear to glide from branch to branch, and in this manner ascend to the very summits. D'Azara states that the toucans are to a certain extent omnivorous, living a great part of the year on fruits, but during the breeding season attacking the smaller birds in their nests, and devouring their eggs or their young. Even the eggs and young of the macaws and other large birds often fall victims to their carnivorous propensities.

Mr. Swainson, who had seen the toucans in their native forests, was led to suspect the same fact, and informed Mr. Broderip that he had frequently observed them perched on the tops of lofty trees, evidently watching the departure of birds from their nests, besides which, the remains of food found in the stomachs of such as were shot proved that eggs and young birds, as well as fruit, constituted their diet. He never, however, observed them in the act of destruction.

Dr. Such stated that he had seen these birds in Brazil feeding on the toucan-berry, and had frequently observed them engaged in quarrels with the monkeys, and that he was certain that the toucans fed also on eggs and nestlings. Mr. Gould in his 'Monograph of the Ramphastidæ,' divides them into two great sections: 1. Ramphastos, with the bill smooth, the nostrils concealed and placed at the edge of the thickened frontlet of the bill; the wings short and rounded; the tail square; the general ground-colour black, the throat, chest, and tail-coverts being of a lively or brilliant hue—red or yellow. (See 1579 and 1580, Head of Toucan.) 2. Pteroglossus (Araçaris), with the bill more contracted in its dimensions, more solid, with the edges more decidedly serrated, the nostrils vertical, naked, and round upon the upper edge of the frontlet of the beak; the tail long and graduated; the predominent colour olive-green, varied with red, yellow, &c. In both groups the skin round the eyes is naked and richly tinted. (See 1593, Head of Araçari.)

1585.—A Group of Ramphastidæ.

a, The Araçari (Pteroglossus Araçari); *b*, the Red-billed Toucan (Ramphastos erythrorhynchus), *c*, the Toco Toucan (R. Toco); *d*, the Black and Yellow Toucan (R. discolorus).

We may here appropriately introduce the description by Mr. Broderip of the habits and manners of a toucan in captivity; the species was the R. erythrorhynchus:—

On the 23rd of November, 1824, the late Mr. Vigors had spoken at the Zoological Club of a living toucan, which was then exhibited in St. Martin's Lane. Mr. Vigors stated that the bird had been fed on a vegetable diet; but that the proprietor had told him that on the occasion of a young Canary-bird having escaped and gone near to the toucan, the latter appeared more than usually excited, that thereupon the barrier between them was removed, and that the toucan instantly seized and devoured the Canary-bird. On the next day Mr. Broderip went to the place where the toucan was exhibited, and thus describes what he saw.—"After looking at the bird which was the object of my visit, and which was apparently in the highest state of health, I asked the proprietor to bring up a little bird, that I might see how the toucan would be affected by its appearance. He soon returned, bringing with him a goldfinch, a last year's bird. The instant he introduced his hand with the goldfinch into the cage of the toucan, the latter, which was on a perch, snatched it with his bill. The poor little bird had only time to utter a short weak cry; for within a second it was dead, killed by compression on the sternum and abdomen, and that so powerful that the bowels were protruded after a very few squeezes of the toucan's bill. As soon as the goldfinch was dead, the toucan hopped with it, still in his bill, to another perch, and placing it with his bill between his right foot and the perch, began to strip off the feathers with his bill. When he had plucked away most of them, he broke the bones of the wings and legs (still holding the little bird in the same position) with his bill, taking the limbs therein, and giving at the same time a strong lateral wrench. He continued this work with great dexterity till he had almost reduced the bird to a shapeless mass; and ever and anon he would take his prey from the perch in his bill, and hop from perch to perch, making at the same time a peculiar hollow clattering noise; at which times I observed that his bill and wings were affected with a vibratory or shivering motion, though the latter were not expanded. He would then return the bird to the perch with his bill, and set his foot on it. He first ate the viscera, and continued pulling off and swallowing piece after piece, till the head, neck, and part of the back of the sternum, with their soft parts, were alone left: these, after a little more wrenching, while they were held on the perch, and mastication, as it were, while they were held in the bill, he at last swallowed, not even leaving the beak or legs of his prey. The last part gave him the most trouble; but it was clear that he felt great enjoyment; for whenever he raised his prey from the perch he appeared to exult, now masticating the morsel with his toothed bill and applying his tongue to it, now attempting to gorge it, and now making the peculiar clattering noise accompanied by the shivering motion above mentioned. The whole operation from the time of seizing his prey to that of devouring the last morsel lasted about a quarter of an hour. He then cleansed his bill from the feathers by rubbing it against the perches and bars of his cage. While on this part of the subject it may be as well to mention another fact, which appears to me not unworthy of notice. I have more than once seen him return his food some time after he had taken it to his crop, and, after masticating the morsel for awhile in his bill, again swallow it; the whole operation, particularly the return of the food to the bill, bearing a strong resemblance to the analogous action in ruminating animals. The food on which I saw him so employed was a piece of beef, which had evidently been macerated some time in the crop. While masticating it, he made the same hollow clattering noise as he made over the remains of the goldfinch. Previous to this operation he had examined his feeding-trough, in which there was nothing but bread, which I saw him take up and reject, and it appeared to me that he was thus reduced from necessity to the above mode of solacing his palate with animal food. His food consists of bread, boiled vegetables, eggs, and flesh, to which a little bird is now added about every second or third day He shows a decided preference for animal food, picking out all morsels of that description, and not resorting to the vegetable diet till all the former is exhausted.

"It is said that the nerves are very much expanded within the internal surface of the bill in these birds, and independently of the sensual enjoyment which the toucan above mentioned appeared to derive from palating his prey, I have observed him frequently scratching his bill with his foot, which may be considered as furnishing additional evidence of the sensibility of this organ While taking his prey he never used his foot for the purpose of conveying it either to his bill or elsewhere The bill was the sole vehicle and the organ actively employed, the foot merely confined the prey on the perch

"But there is yet another of the peculiarities of this bird which cannot be passed over in silence When he settles himself to roost, he sits a short time with his tail retroverted, so as to make an acute angle with the line of his back, he then turns his bill over his right shoulder, nestling it in the soft plumage of the back (on which last the under mandible rests), till the bill is so entirely covered that no trace of it is visible. When disturbed, he did not drop his tail, but almost immediately returned his bill to the comfortable nidus from which on being disturbed he had withdrawn it He broke a short time ago some of his tail feathers, and the proprietor informed me that before that accident the bird when at roost retroverted his tail so entirely that the upper surface of the tail-feathers lay over and came in contact with the plumage of the back, so that the bird had the appearance of a ball of feathers, to which indeed when I saw him he bore a very considerable resemblance The proprietor informs me that he always roosts in the same way" ('Zool. Journ.' vol i)

In a subsequent volume (ii) Mr Vigors gives the following interesting account of a toucan, Ramphastos Ariel (Vig), which he kept in a state of domestication for many years —

"With respect to the manners of my bird, I can add but little to the very accurate and interesting account of those of a species nearly allied to it, which has appeared in a preceding number of this Journal * I have not allowed it to be indulged in that disposition to animal food which so strikingly belongs to this family I find in fact that it thrives sufficiently well upon a vegetable diet, and I fear that if it should once be allowed any other, it would be difficult to restrain its inclination for it within moderate limits Eggs are the only animal food with which it has been supplied since it came into my possession Of these it is particularly fond, and they are generally mixed up in his ordinary food, which consists of bread, rice, potatoes, German paste, and similar substances He delights in fruits of all kinds During the period when these were fresh, he fed almost exclusively on them; and even in the present winter months he exhibits great gratification in being offered pieces of apples, oranges, or preserved fruits of any description These he generally holds for a short time at the extremity of his bill, touching them with apparent delight with his slender and feathered tongue, and then conveying them by a sudden upward jerk to his throat, where they are caught and instantly swallowed. His natural propensity to preying upon animals, although not indulged, is still strongly conspicuous. When another bird approaches his cage, or even a skin or preserved specimen is presented to him, he exhibits considerable excitement. He raises himself up, erects his feathers, and utters that 'hollow clattering sound' noticed by Mr. Broderip, which seems to be the usual expression of delight in these birds, the irides of his eyes at the same time expand, and he seems ready to dart upon his prey, if the bars of his cage permitted his approach On one occasion, when a small bird was placed by chance over his cage at night, he showed great restlessness, as if aware of the neighbourhood of the bird, and he would not be composed until the cause of his anxiety was discovered and removed

"When in his cage, he is peculiarly gentle and tractable, suffers himself to be played with, and feeds from the hand Out of his cage he is wild and timid In general he is active and lively; and, contrary to what might be expected, from the apparent disproportion of the bill and the seemingly clumsy shape of the birds of this genus, as they are usually set up or represented in figures, his appearance is not only graceful, but his movements, as he glides from perch to perch, are light and sylph-like, so much so as to have suggested to an intelligent friend who witnessed them the specific name which I have ventured to assign him. He keeps himself in beautiful plumage, his lighter colours being strikingly vivid, and the deep black of his upper body in particular being always bright and glossy. For this fine condition he seems to be much indebted to his fondness for bathing Every day he immerses himself in cold water with apparent pleasure, even in this severe weather, and in no respect indeed does he appear to suffer by the transition from his own warm climate to our uncongenial atmosphere

"Besides the 'hollow clattering noise,' as my friend Mr Broderip so expressively terms the usual sounds of these birds, he utters at times a hoarse and somewhat discordant cry when he happens to be hungry, and to see his food about to be presented to him On such occasions he stands erect, raising his head in the air, and half opening his bill as he emits this cry. These are the only sounds I have heard him utter; and in neither can I say that I have detected any similarity, or even approach, to the word Toucan, as has sometimes been asserted, and from whence the trivial name of the genus has been supposed to originate. Neither have I been able to verify another observation which has been advanced respecting these birds, that the bill is compressible between the fingers in the living bird The bill, notwithstanding the lightness of its substance, is firm, and capable of grasping an object with much strength. The mode in which Mr Broderip describes his toucan as having broken the limbs of the bird which he was about to devour, by 'a strong lateral wrench,' sufficiently shows that the bill is not deficient in power. Indeed I generally observe that my bird takes what is offered him rather by the sides than by the point of his bill, and, I suspect that much of the powers of that member are centred in this lateral motion The serration of the edges also may be supposed to tend to these peculiar powers The manner in which he composes himself to rest is represented in the accompanying plates Since the cold weather has commenced he has been brought into a room with a fire, and the unusual light seems to have interfered with his general habits, he does not go to rest as early or as regularly as was his custom, and he sometimes even feeds at a late hour. During the warmer months, however, when he was more free from interruption, his habits were singularly regular As the dusk of the evening approached, he finished his last meal for the day, took a few turns, as if for exercise after his meal, round the perches of his cage, and then settled on the highest perch, disposing himself, almost at the moment he alighted on it, in the posture represented, his head drawn in between his shoulders, and his tail turned vertically over his back (Fig 1586 represents the bird in this attitude)

"In this posture he generally remained about two hours, in a state between sleeping and waking, his eyes for the most part closed, but opening on the slightest interruption At such times he would allow himself to be handled, and would even take any favourite food that was offered him without altering his posture further than by a gentle turn of the head He would also suffer his tail to be replaced by the hand in its natural downward posture, and would then immediately return it again to its vertical position In these movements the tail seemed to turn as if on a hinge that was operated upon by a spring At the end of about two hours he began gradually to turn his bill over his right shoulder and to nestle it among the feathers of his back, sometimes concealing it completely within the plumage, at other times having a slight portion of the culmen exposed. At the same time he drooped the feathers of his wings and those of the thigh-coverts, so as to encompass the legs and feet, and thus nearly assuming the appearance of an oval ball of feathers, he secured himself against all exposure to cold' (See Fig. 1587)

1588 —THE TOCO TOUCAN

(*Ramphastos Toco*) This species is the most common in museums, and appears to have been the first with which European naturalists became acquainted It is one of the largest of its family, measuring twenty seven inches total length, of which the bill is seven inches and a half, and the tail seven it is at once distinguished by the black oval mark at the tip of the beak This bird is distributed throughout the whole of wooded districts from the river Plata to Guiana.

1589 —CUVIER'S TOUCAN

(*Ramphastos Cuvieri*, Gould) This rare species, of which only two or three specimens are extant in Europe, is a native of the wooded borders of the Amazon The beak is brownish black on the sides, with a large basal belt and culminal line of greenish yellow, the basal belt being bounded behind by a narrow line of black, and before by a broader one of deep black, which is only apparent in certain lights, the top of the head and the whole of the upper surface black; with the exception of the upper tail-coverts, which are bright orange yellow; cheeks, throat, and chest white, with a tinge of greenish yellow, terminated by a band of scarlet; under surface black; under tail-coverts scarlet. Total length 24 inches; bill 7½, wings 9, tail 6½, tarsi 2. (Gould.)

1590.—THE CURL-CRESTED ARAÇARI

(*Pteroglossus ulocomus*, Gould). This rare species, one of the most beautiful of its tribe, was first figured and described by Mr. Gould, in his monograph of the present family. Two examples formed part of a collections of birds brought to this country from Rio de Janeiro Of these Mr. Gould was so fortunate as to obtain the finest, apparently a male, now in the museum of the Zoological Society; the other is in the British Museum The native country of this species is probably the dense forest-belt along the river Amazon, but we have no details respecting its history The beak of this araçari is lengthened, both mandibles being edged with thickly-set white serratures, the upper has the culmen of an orange colour, bordered by a longitudinal stripe of dull blue extending nearly to the tip, below which the sides of the mandible are fine orange red, a white line surrounds the apertures of the nostrils, the under mandible is straw-colour, becoming orange at the tip, a narrow band of rich chestnut encircles both mandibles at their base The crown of the head is covered with a crest of curled metal-like feathers without barbs and of an intense glossy black, as they approach the occiput these singular feathers lose their curled character and become straight, narrow, and spatulate. It is, as Mr. Gould observes, impossible for the pencil to do justice to the brilliancy of these curiously curled appendages, the structure of which appears to consist in a dilatation of the shaft of each feather, or perhaps an agglutination of the web into one mass. The feathers on the cheeks have the same form as those on the occiput, but are more decidedly spatulate, being of a yellowish white colour, tipped at the extremity with black. The occiput and upper tail-coverts are of a deep blood-red, the chest is delicate yellow, with slight crescent-shaped bars of red; the back, tail and thighs are olive-green; the quills brown, the tarsi lead-coloured. Total length 18 inches; bill 4, tail 7½

1591 —THE MANY-BANDED ARAÇARI

(*Pteroglossus pluricinctus*). This beautiful bird is a native of Brazil In the male (lower figure) a broad band of black advances from the nostrils along the whole of the culmen, and forms a narrow belt down the sides of the upper mandible at its base; the elevated basal margin of the bill is yellow; the sides of the upper mandible beautiful orange yellow, fading into yellowish white towards the tip, under mandible wholly black with a yellow basal ridge; head, neck, and chest, black, whole of the upper surface, except the rump, which is scarlet, dark olive green, breast marked with two broad bands of black, the upper separated from the throat by an intervening space of yellow dashed with red, a similar but broader space separates the two bands of black, the lower of which is bounded by scarlet, advancing as far as the thighs, which are brownish olive, under the tail coverts light yellow, naked space round the eyes, tarsi, and feet dark lead-colour

The female differs from the male in having the ear-coverts brown and a narrow belt of scarlet bordering the black of the throat.

Total length 20 inches, bill 4½, wings 6½, tail 8½. (Gould)

1592 —HUMBOLDT'S ARAÇARI

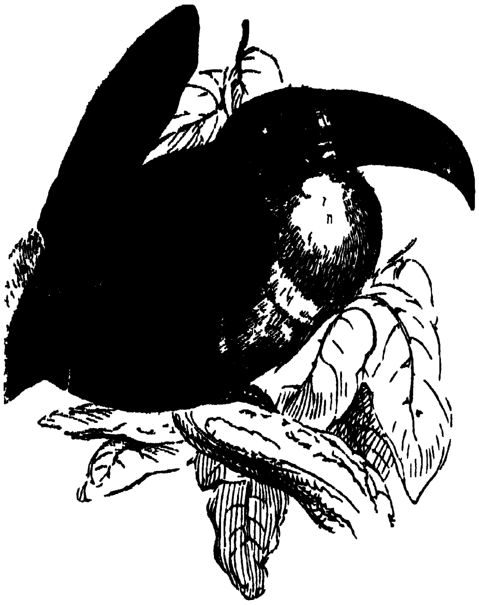
(*Pteroglossus Humboldtii*, Gould). This species is a native of Brazil, probably near the Amazon It is described as follows by Mr. Gould —Bill large in proportion to the body, a band of black occupies the culmen from the base to the tip, the remainder of the upper mandible of a dull yellowish orange, with the exception of an indefinite mark of black which springs from each serrature, and a fine line of the same colour surrounding it near the base, lower mandible black, with the exception of the base, which is surrounded with pale yellowish orange, the head, back of the neck, throat, and chest black, all the upper surface, except a spot of scarlet on the rump, of a dull olive primaries blackish brown, under surface pale straw-yellow with a slight tinge of green, thighs chestnut, naked space round the eyes and tarsi lead colour Total length about 16 to 17 inches bill 4, wing 5½, tail 6½, tarsi 1½

Mr Gould's elegant figure of a male is taken from a specimen, supposed to be unique, in the Cabinet of Natural History at Munich.

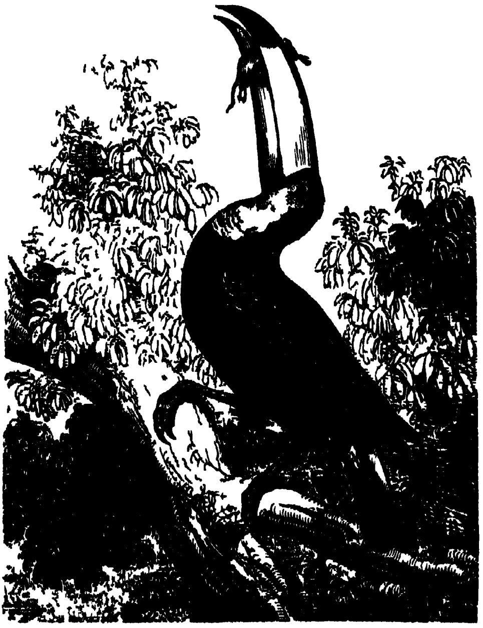
We shall conclude our sketch of the present family with a few general observations

---

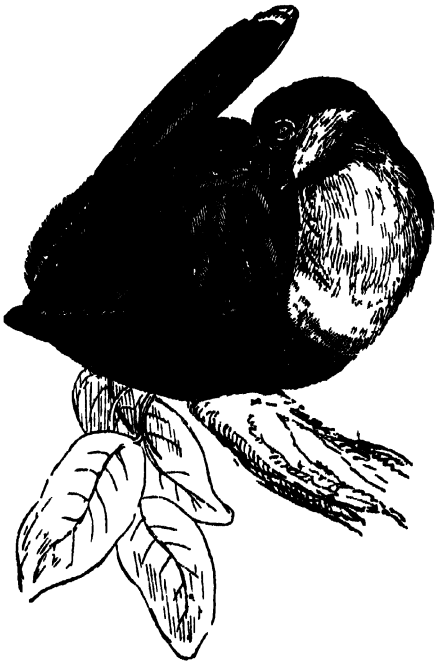
* Mr Broderip's account, above given



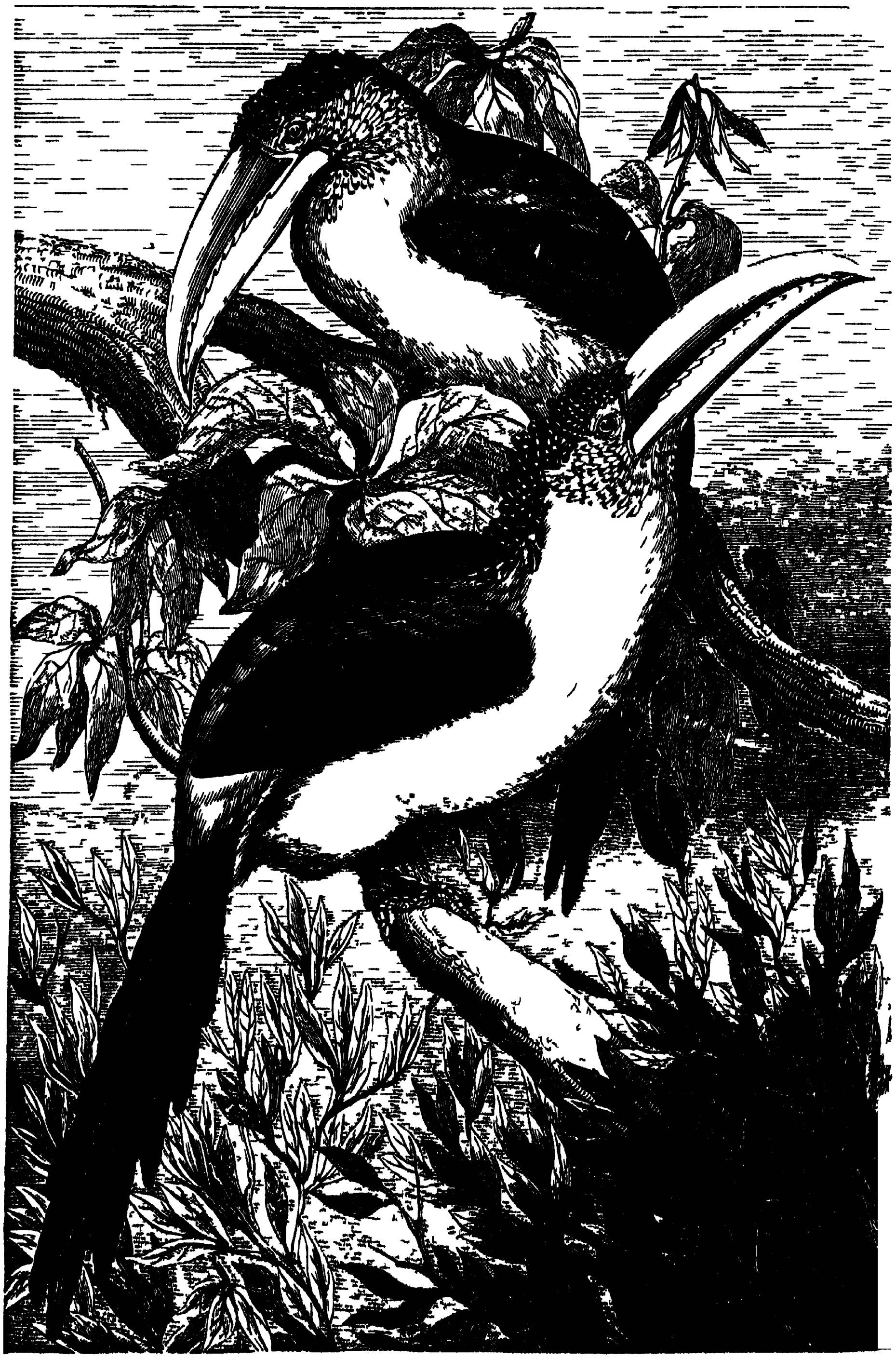
1586 —Toucan at roost first stage



1588 —Toco Toucan

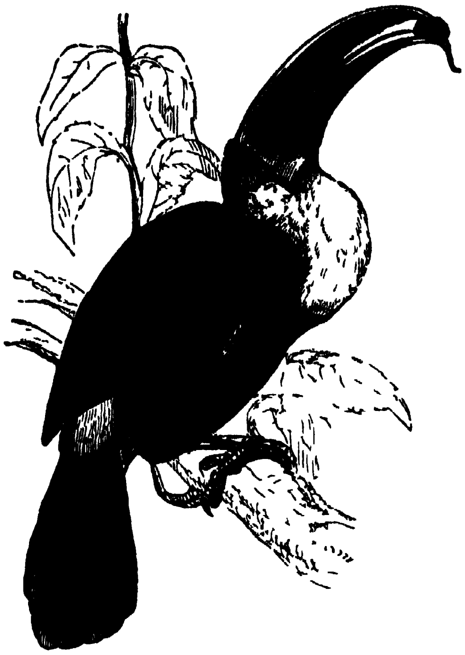


1587 —Toucan at roost; second stage



1590 —Curl-crested Araçaris.

1593.—Head of Aracari



1589.—Cuvier's Toucan

1592.—Humboldt's Aracari

1591.—Many banded Aracaris

1596.—Cuckoo.

1597.—Young Cuckoo in Hedge-Sparrow's Nest.

The omnivorous appetite of these birds affords us a clue to the reasons why the beak is so greatly developed, and yet so light from the delicacy of its structure; *it is at once an organ of prehension and a feeler.* The toucan plunges it into the fissures and holes of trees, where various birds habitually *nidify, and there feels for eggs or nestlings,* and draws them forth; it can penetrate the basket-work of nests suspended from the branches, or the more solid structure of such as are composed of strong materials. At the same time it can use this organ in the acquisition of fruits, which, being plucked one by one, it jerks up before swallowing. In its mode of feeding, its long elastic feathery tongue is of great use, enabling the bird to turn the morsel about, and co-operating with the movements of the mandibles.

The toucans and araçaris breed in the hollows of decayed trees, which they enlarge, and render commodious by means of the beak, as Faber and Oviedus were assured; and it would appear that from this habit the Spaniards have applied the name of Carpentero to these birds, which the Brazilians call Tacataca, in imitation of the sound made by chipping the decayed wood. Oviedus, in his 'History of the West Indies,' observes that no bird better defends her young against the attacks of the monkeys, so dangerous to nestlings, than the toucan; for when she perceives the approach of these enemies, she so settles herself in her nest, as to put her bill out at the hole, and gives the monkeys such a reception with its sharp point, that they instantly retreat, glad to escape.

The toucans differ from the araçaris not only in the points we have already enumerated, but also in the circumstance that the females resemble the males in the colour of the plumage, but are rather less in all their proportions, while in many of the araçaris there is considerable difference in the colouring of the two sexes. The young of both genera assume at an early age the permanent tints, but their bills are not fully developed for a considerable period: during life the colouring of the bills is generally very vivid, but after death the bright hues fade and become sometimes almost obsolete—a fact which should be borne in mind by those who examine specimens in cabinets or museums.

Family CUCULIDÆ (CUCKOOS).

This family is very extensive, and has been divided into several sections or subfamilies by various naturalists, not without reason, for these minor groups, with great modification of form, exhibit very different habits and manners. Of this numerous family one species visits our island, the well-known cuckoo, herald of the spring; but instances are on record of the Yellow-billed American Cuckoo (Erythrophrys Americanus) having appeared both in England and Ireland; these visits were only accidental, the birds having most probably been driven out of their course, when migrating from the northern latitudes of America to the south. In every instance, we believe, it was in autumn that these birds were seen and killed, and that too in the western districts of our island and in Ireland: viz. twice in the latter island, once in Wales, and once in Cornwall.

Mr. Swainson, speaking of the Cuculidæ as a family, of which he gives the following definition, "feet not strictly scansorial, very short, nostrils naked, tail-coverts remarkably long," adds, "So faintly is the scansorial structure indicated in these birds, that but for their natural habits, joined to the position of their toes, we should not suspect they were connected with the more typical groups of the tribe, as they undoubtedly are. They neither use their bill for climbing like parrots, or for making holes in the trees like woodpeckers, neither can they mount the perpendicular stems like the Certhiadæ, or creepers; yet they decidedly climb, though in a manner peculiar to themselves. Having frequently seen different species of the Brazilian cuckoos (forming part of the genus Coccyzus) in their native forests, I may safely affirm that they climb in all other directions than that of the perpendicular. Their flight is so feeble from the extreme shortness of their wings" (this does not apply to our species and many others), "that it is evidently performed with difficulty, and it is never exercised but to convey them from one tree to another, and these flights in the thickly-wooded tracts of tropical America are of course very short; they alight upon the highest boughs, and immediately begin to explore the horizontal and slanting ramifications with the greatest assiduity, threading the most tangled mazes, and leaving none unexamined. All soft insects, inhabiting such situations lying in their route, become their prey, and the quantities that are thus destroyed must be very great. In passing from one bough to another they simply hop without using their wings, and their motions are so quick that an unpractised observer, even if placed immediately beneath the tree, would soon lose sight of the bird. The Brazilian hunters give their cuckoos the general name of cat's-tails; nor is the epithet *inappropriate, for their long hanging tails,* no less than their mode of climbing the branches, give them some distant resemblance to that quadruped. *I* have no doubt that the great length of tail possessed by nearly all the cuckoos is given them as a sort of balance, just as a rope-dancer with such an instrument in his hands preserves his footing when otherwise he would assuredly fall." This use of the tail, we may observe, is not peculiar to cuckoos only; nor do we agree with Mr. Swainson in his views generally, while we fully appreciate the graphic description he has given of the Brazilian cuckoos, the habits of which he had ample opportunity of studying.

Warm and temperate regions are the favourite abodes of the Cuculidæ; many of them are migratory, passing the winter in the tropical regions, where they find a congenial asylum. Insects and their larvæ, together with soft fruits, constitute their diet. Some species make no nest, but deposit their eggs in the nests of other birds, by whom the young cuckoos are reared to the destruction of their own brood. With certain exceptions the Cuculidæ are distinguished for great powers of flight, and have long and pointed wings.

1594, 1595, 1596.—The Cuckoo

(*Cuculus canorus*). This species is an example of the typical group of the Cuculidæ. The bill is somewhat curved and compressed, with a wide gape, and round naked nostrils at the base of the upper mandible; the wings are pointed; the tail somewhat wedge-shaped; the tarsi short and feathered a little way beneath the upper joint.

The cuckoo is the κόκκυξ of the Greeks; Cuculus and Coccyx of the Latins; Cucculo, Cucco, Cuco, Cucho, Cuccù, of the modern Italians; Cocou, Coucou, Cocqu, of the French; Kukuk and Kuckuck of the Germans; Gjok of the Fauna Suecica, Gjoeg of the Danes; Gouk of the Norwegians; Cog of the ancient British; Gowk, Provincial English.

This well-known bird arrives in our islands early in spring: in White's 'Naturalist's Calendar' it is noted as being first heard April the 7th; and in Markwick's April the 15th, and last heard June the 28th. By the first of July it has generally taken its departure for Northern Africa. In Ireland, according to Mr. Thompson, the cuckoo is usually heard from the 16th to the 20th of April, and departs at the end of June, but he adds that in the year 1838 the stay of the cuckoo was remarkably prolonged, and the period of its arrival later than ordinary, and that one was heard at the Falls near Belfast on the 7th of July. "The young birds of the year generally remain till towards the end of August, so late as the 27th of which month they have been observed in Antrim." The Bishop of Norwich, in his 'Familiar History of Birds,' records an instance of about forty cuckoos being congregated in a garden in the county of Down, from the 18th to the 22nd of July, and, with the exception of two which were smaller than the rest, taking their departure at that time. These were no doubt all young birds of the year, and it is probable that the two smallest were never able to follow the others, but remained to perish. Of such a character were the benumbed denuded birds which have been occasionally found in hollow trees or the thickest part of furze-bushes, whither they had crept for shelter, and which have been noticed by Willughby, Bewick, and others.

The cuckoo is insectivorous in its diet, and will sometimes feed upon the wing. Gilbert White says, "In July I saw several cuckoos skimming over a large pond, and found, after some observation, that they were feeding on the Libellulæ, or dragon-flies, some of which they caught as they settled on the weeds, and some as they were on the wing." The favourite food of this bird, however, are the hairy caterpillars of some of the lepidopterous order; these it kills by passing them through the sharp edges of its mandibles, it then nips off the hinder end of the caterpillar, and with a jerk or two clears the body of the alimentary canal, and immediately swallows it whole. With the hairs of these caterpillars the stomach is often completely coated. In a communication by Mr. Thompson to the Zoological Society in 1834, he states that in three cuckoos, examined in 1833, the stomach, with the exception of some small sharp gravel, was entirely empty and coated closely over with hair.

"Attention was called to this, that the hair with which it is lined might be observed. From its close adhesion to the inner surface of the stomach, and from the regularity with which it is arranged, Mr. Thompson was at first disposed to consider this hair as of spontaneous growth; but part of the stomach being subjected to maceration in water, and afterwards viewed through a microscope of high power, the hairs proved, to the entire satisfaction of Mr. Owen and himself, to be altogether borrowed from the larvæ of the tiger-moth (Arctia caja), the only species found in the stomach of several cuckoos, from different parts of the north of Ireland, which were examined by Mr. Thompson in the months of May and June, 1833, and whose stomachs were similarly coated." ('Proceeds. Zool. Soc.' 1839, p. 29.)

The well-known notes of the cuckoo are confined only to the male, the female making only a chattering noise.

The singular habit of the cuckoo in depositing its eggs in the nests of other birds is too well substantiated to admit of a doubt; the nests usually chosen are those of the Hedge-sparrow, Titlark, Whitethroat, Wagtail, &c. The egg is very small in comparison with the size of the cuckoo, scarcely exceeding that of the common chaffinch: when the young cuckoo is hatched, and acquired a little strength, guided by the instinct of self-preservation, it dislodges all its weaker companions by insinuating itself under them, and with a sort of jerk forcing them overboard. Thus it secures to itself the exclusive attention of its dupes of foster-parents. Gilbert White mentions a young cuckoo found in the nest of a titlark, which he describes as being very fierce and pugnacious, pursuing his finger as he teased it for many feet from the nest, and sparring and buffeting with its wings like a game-cock; and Selby alludes to the same bold and pugnacious disposition.

Many attempts have been made to keep the cuckoo alive in captivity, and several have lived with care to the middle of winter, when they have died. Mr. Thompson, however, instances two exceptions: one of these lived for more than a year at Cranmore, near Belfast, the residence of John Templeton, Esq.; it was procured on the 20th of July, 1820, and died in consequence of an accident, January the 10th, 1822. It was originally taken from a titlark's nest. Its engaging manners, says Mr. Templeton, were the delight of the whole family and the admiration of strangers. "It was generally fed on hard-boiled eggs, and occasionally with caterpillars; it would sometimes eat forty or fifty at a time of those of the Papilio Brassidæ; it, however, showed a decided preference for rough ones, as those of the Papilio Urticæ: a seeming treat was a little mouse about one quarter grown, which it would hold in its bill and beat against the ground, or anything hard, until the animal became soft, when it exhibited great powers of extending its throat and swallowing. What, however, was most extraordinary, it was never known to drink; though when presented with a drop of water at the end of a finger or straw it would sip it, and it seemed to delight, when seated on its mistress's or other person's hand, to put its bill into their mouths and sip saliva. It delighted very much in heat and sitting in the sunshine, and its feathers were so much broken by its striking them against the furniture, that it could fly but very imperfectly, and was apparently very thankful to any person who would help it upon the first sash of the window. At other times it sat upon the fender, turning itself in various directions, and spreading its wings and feathers to receive the heat, of which it could bear a temperature equal to 100 degrees, for a considerable time, with seeming satisfaction. During cold weather it slept at its mistress's bed-side, covered with a piece of flannel, which was well warmed previous to its going to rest. With this attention it generally remained quiescent till morning; but on feeling cold, sometimes presumed so far as to creep under the bed-clothes. It was only to those from whom it had received some hurt or persecution that it expressed dislike or fear, which it did by raising its neck-feathers and putting itself in an attitude of defence. It never uttered the cry of the male, *cuckoo*, but sometimes when persons were in the room laughing it would apparently join and emit a noise somewhat like the barking of a little dog. At other times the only sound it made was a kind of low chattering expressive of pleasure when it got into a warm place, or on seeing its mistress after she had been absent some hours. It received the unlucky tramp which finally killed it, from having lost too much the apprehension of injury." ('Ann. and Mag. of Nat. Hist.' 1842, p. 223.)

Fig. 1597 represents a young cuckoo in the nest of the hedge-sparrow.

The young cuckoo (Fig. 1595) differs greatly in colouring from the adult, and is of more rufous tint, transversely barred with dusky black. In length the adult male is about 14 inches; weight about 4½ ounces. Bill black, yellowish at the base of the upper mandible: inside of mouth red. Irides yellow. Head and whole upper part of the bird dark ash-colour. Throat, under side of the neck, and upper part of the breast pale ash, the latter sometimes inclining to rufous brown; lower part of the breast and belly white with transverse undulating black lines. Quills, dusky, inner webs barred with white oval spots. Tail-feathers ten, of unequal length; two middle ones black, dashed with ash and tipped with white, the rest black, with white spots on each side of the shaft. The lateral feathers in some have white spots only on the interior webs, but all are tipped with white.

1598.—Le Vaillant's Cuckoo

(*Oxylophus Levaillantii*, Swains.). Mr. Swainson thus characters the genus Oxylophus, which he has established, taking this species as the type:—

Bill slender, considerably compressed nearly its whole length; upper mandible entire; nostrils ovately round; head crested; wings moderate, pointed, shorter than the tail-coverts, the fourth quill longest; tarsi moderate, naked; upper tail-coverts long, but not rigid. Inhabits the Old World: parasitic.

Le Vaillant's cuckoo has the head crested with pointed feathers; plumage above, black glossed with green; band at the base of the quills, end of the tail, and other parts of the body white; throat striped with black. Wings long, but rounded; fifth quill longest. Total length fifteen inches. Mr. Swainson, whose description we have given, says that, unlike the true cuckoos, these birds rear and provide for their young in the ordinary manner. It is a native of Senegal and the Western Coast of Africa.

1599.—The Yellow-billed Cuckoo

(*Erythrophrys Americanus*, Swains.). Cuculus Carolinensis, Wilson; Coccyzus Americanus, Prince of Musignano; Carolina Cuckoo, Latham.

According to Audubon, the flight of the bird is rapid, silent, and horizontal, as it moves from one tree to another, or across a field or river, and is generally continued amongst the branches of the trees in our woods. When making its way among the branches, it occasionally inclines the body to either side, so as alternately to show its whole upper or under parts. During its southward migration, it flies high in the air, and in such loose flocks that the birds might seem to follow each other, instead of their keeping company together. On the other hand, early in March the greater number enter our southern boundaries singly, the males arriving first, and the females a few weeks after. They do not fly in a continued line, but in a broad front, as, while travelling with great rapidity in a steam-boat, so as to include a range of a hundred miles in one day, I have observed this cuckoo crossing the Mississippi at many different points on the same day. At this season they resort to the deepest shades of the forests, and intimate their presence by the frequent repetition of their dull and unmusical notes, which are not unlike those of the young bull-frog. These notes may be represented by the word *cow, cow*, repeated eight or ten times with increasing rapidity. In fact, from the resemblance of its notes to that word, this cuckoo is named cow-bird in nearly every part of the Union. The Dutch farmers of Pennsylvania know it better by the name of Rain crow, and in Louisiana the French settlers call it Coucou. It robs smaller birds of their eggs, which it sucks on all occasions, and is cowardly and shy, without being vigilant. On this latter account it often falls a prey to several species of hawks, of which the pigeon-hawk (Falco columbarius) may be considered as its most dangerous enemy. It prefers the southern states for its residence, and when very mild winters occur in Louisiana some individuals remain there, not finding it necessary to go farther south. This bird is not abundant anywhere, and yet is found very far north. I have met with it in all the low grounds and damp places in Massachusetts, along the line of Upper Canada, pretty high on the Mississippi and Arkansas, and in every state between these boundary-lines. Its appearance in the state of New York seldom takes place before the beginning of May, and at Green Bay not until the middle of that month. A pair here and there seem to appropriate certain tracts to themselves, where they rear their young in peace and plenty. They feed on insects, such as caterpillars and butterflies, as well as on berries of many kinds, evincing a special predilection for the mulberry. In autumn they eat many grapes, and I have seen them supporting themselves by a momentary motion of their wings opposite a bunch, as if selecting the ripest, when they would seize it and return to a branch, repeating their visits in this manner until satiated. They now and then descend to the ground to pick up a wood snail or a beetle. They are extremely awkward at walking, and move in an ambling manner, or leap along sidewise, for which the shortness of their legs is ample excuse. They are seldom seen perched conspicuously on a twig, but, on the contrary, are generally to be found amongst the thickest boughs and foliage, where they emit their notes until late in autumn, at which time they discontinue them. The nest is simple, flat, composed of a few dry sticks and grass, formed much like that of the common dove, and, like it, fastened to a horizontal branch, often within the reach of man, who seldom disturbs it. It makes no particular selection as to situation or the nature of the tree, but settles anywhere indiscriminately. The eggs are four or five, of a rather elongated oval form, and bright green colour. They rear only one brood in a season, unless the eggs are removed or destroyed. The young are principally fed with insects during the first weeks. Towards autumn they become very fat, and are fit for being eaten, although few persons, except the Creoles of Louisiana, shoot them for the table.

That accurate observer of nature Mr. Wilson, the American ornithologist, to his account of this bird, adds the following interesting observations:—"In examining this bird by dissection, the inner membrane of the gizzard, which in many other species is so hard and muscular, in this is extremely lax and soft, and capable of great distension; and what is remarkable, is covered with a growth of fine down or hair, of a light fawn-colour. It is difficult to ascertain the particular purpose which nature intends by this excrescence; perhaps it may serve to shield the tender parts from the irritating effects produced by the hairs of certain caterpillars, some of which are said to be almost equal to the sting of a nettle."

We have already described the hairy lining of the stomach of our British cuckoo, which from its regularity and closeness Mr. Thompson was at first inclined to believe of natural growth, but which proved to be the hair of the caterpillar of the tiger-moth. Now we have little or no hesitation in saying that the hairs which Wilson found in the stomach of the present species, and which he too believed to be of spontaneous growth, were also those of some caterpillar on which the bird abundantly feeds. We are not aware that this observation of Wilson's has attracted the notice of naturalists, to whose attention we would point it out.

1600.—The Gilded Cuckoo

(*Chalcites auratus*, Swainson). Cuculus auratus of authors. This brilliant little Cuckoo, the Didric of Le Vaillant (so called from its cry), is abundant in Caffraria and Namaqua-land. In manners, as in form, it closely approximates to our European cuckoo; the female deposits its eggs in the nests of other birds, and, as Le Vaillant's observations seem to prove, she conveys them in her beak, or rather throat, to the nest selected.

The following observations from Le Vaillant's narrative may not be uninteresting:—Speaking of its numbers he states that his Hottentot servant Klaas shot two hundred and ten males, one hundred and thirty females, and one hundred and three young ones—in all four hundred and forty-three, and that numbers more might easily have been procured; beside which he found eighty-three of their eggs in as many nests of insectivorous birds. He then proceeds:—"Although this bird be so common if not in the immediate environs, yet about one hundred leagues from Cape Town, it was scarcely known in Europe before my voyages, and in France there was only one mutilated and badly preserved specimen of it to be seen in the Royal Museum at Paris. I myself brought over one hundred and fifty males and females, as well as young birds, which are now exhibited in the chief cabinets of Europe. To this beautiful species I am indebted for my chief knowledge of the cuckoo family. From the facility I had of leisurely and successfully observing its manners, I always entertained the hope that I should one day surprise a female Didric in the act of depositing its egg in the nest of another bird, but having been disappointed in this respect, I began to imagine that my ignorance on this point would never be removed, when one day having killed a female of this species, and wishing to introduce a plug of hemp into his throat according to my custom after bringing down a bird, in order to prevent the blood from staining its plumage, I was not a little surprised, on opening its bill for this purpose, to find in its throat an entire egg, which I knew immediately from its form, size, and beautiful whiteness, to belong to the Didric. Delighted at length, after so many useless efforts, at having obtained a confirmation of my suspicions, I loudly called my faithful Klaas, who was only a few paces distant from me, to whom I imparted my discovery with much pleasure, as he had used his best exertions to second my views. Klaas, on seeing the egg in the bird's gullet, told me that after killing female cuokoos, he had frequently observed a newly broken egg lying upon the ground near where they had fallen, which he supposed they had dropped in their fall, being at that moment ready to lay. I recollect very well that when this good Hottentot brought me the fruits of his sports, he frequently remarked, as he pointed to the cuckoo, 'This one laid her egg as she fell from the tree.' Although I was convinced from this circumstance that the female cuckoo deposits her egg in the nests of other birds by conveying it in her beak, I was desirous to collect what facts I could on the subject; Klaas and I, therefore, began to shoot as many cuckoos as we could meet with, which accounts for the great number of this species we procured. However, among all the specimens there occurred only one instance similar to that I have just mentioned, namely, that of a second female, which was transporting her egg in her mouth, like the former."

In length this species is about seven inches: the plumage above is rich glossy green with golden reflexions; the head is marked with stripes of white, with which the secondary quills and many of the wing-coverts are tipped; under parts white. In the female the general colour is reddish gold or bronzy hue, with all the markings more obscure.

1601.—The Eastern Black Cuckoo

(*Eudynamys Orientalis*). Cuculus Orientalis, Linn. The generic characters of Eudynamys are as follows:—Bill strong, thick, the under mandible not curved, and angulated beneath; upper mandible entire; wings pointed, the fourth quill longest; tarsi much shorter than the longest toe; the upper part plumed; rump and tail-coverts soft. Inhabits the Old World.

We know little of the habits of the Black Cuckoo, excepting that berries most probably form a considerable part of its diet, as those of the Cassytha were found in the stomach of a specimen procured by Mr. Caley at Mindanao, where it appears to be an accidental visitor. The male and female differ greatly in colour. Plumage of male, black with metallic lustre; bill yellow. Female:—Above shining greenish brown spotted with white; tail-feathers banded with white; whitish beneath, transversely undulated with greenish brown. Synonyms—Cuculus Mindanensis, Linn. Coucou tacheté de Mindanao 'Enl.' 277; Mindanao Cuckoo, Lath.

1602.—The Ani

(*Crotophaga Ani*). This singular bird with zygodactyle feet occupies a double position. Mr. Swainson places it within the pale of the Cuculidæ; but perhaps it really forms the type of a separate family. The bill is short, very much compressed, arched, elevated, and surmounted by a vertical trenchant crest; nostrils basal, open; fourth and fifth quills the longest; tail long and rounded. Locality, the tropical regions of the New World and the West Indian Islands. This species is the Razor-billed Blackbird of Jamaica of Catesby, the Savannah Blackbird of the English colonists, and the Great Blackbird of Sloane.

In Guiana, these birds are named Ani, and Anno in Paraguay. In Mexico they are named, according to Hernandez, Cacalototl; and in the Antilles Bouts de Petun, Amangoua, Diables de Savannes, and Perroquets noirs. In Cayenne their common name is Bouilleur de Canari. Their general colour is black, with more or less metallic reflexions.

In size they equal a common turtle-dove. The Anis lives in flocks, and are so far from timid, that when they see their companions fall before the gun, the survivors fly but a short way, and then again pitch. Bushes, the skirts of woods, and the borders of flooded savannahs are their favourite haunts. Their food consists of small lizards, insects, and seeds. Many pairs are said to use the same nest, built on the branches of trees, and of large dimensions when considered in relation to the number of couples occupying it, where they lay and hatch their young in concert.

According to Brown ('Hist. Jamaica') they live chiefly upon ticks and other small vermin, and may frequently be seen jumping about all the cows and oxen in the fields; nay, they are often observed to fly on their backs, unless they lie down for them, which, if much troubled with ticks, they generally do when they see the birds about them; but if the beast be heedless, they hop once or twice round it, looking it very earnestly in the face every time they pass, as if they seemed to know that it was only requisite to be seen to be indulged. They are very noisy birds, and one of the most common sorts in all the pastures of Jamaica. Their flight is low and short.

The Ani is easily tamed, and may be taught to utter words. Its flesh is said to be extremely disagreeable.

In closing our sketch of the cuckoos, we may advert to some other groups of birds usually associated with them, as the Honey-Guides (Indicator) of Africa; the Coucals, or lark-heeled Cuckoos (Centropus); and the Malcohas (Phœnicophaus), which must be regarded as barely coming within the family section.

The genus Indicator is characterised by the beak being short, high, and almost conical, like that of a sparrow, and by the form of the tail, which consists of twelve feathers, and is at the same time a little graduated and a little forked. The skin is very tough, so as to resist the stings of the bees whose nests the birds despoil. The celebrated Honey-Guide of South Africa (Indicator Vaillantii) is an example. The Coucals (Centropus) have a long

1598.—Le Vaillant's Cuckoo.

1601.—Eastern Black Cuckoo.

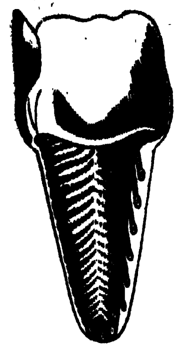
1600.—Gilded Cuckoo.

1595.– Young Cuckoo.

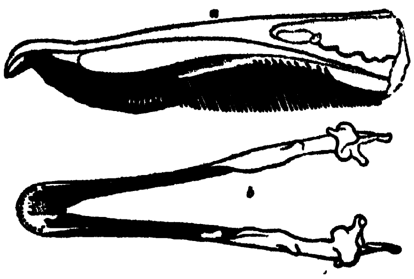
1596,—Cuckoo and nest

1599.—Yellow-billed Cuckoo

1602.—Ani.

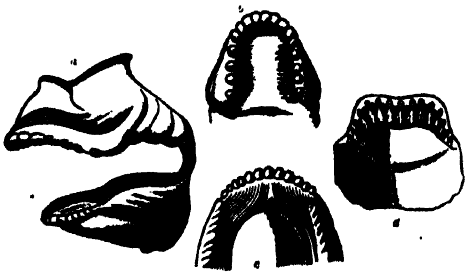


1606.—Palate of Blue Macaw.

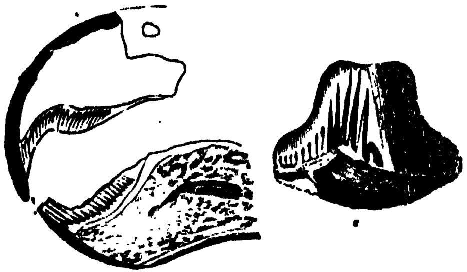


1609.—Beak of Shoveller Duck.

1604.—Group of Parrots.



1607.—Teeth of Parrakeet.



1608.—Teeth of Blue Macaw.

slightly curved beak, and the claw of the inner of the two hind-toes is long, straight, and pointed, reminding us of that of the lark. These birds appear to be of solitary and recluse habits; they feed on insects, and even small reptiles, and breed in the holes of trees, and are said to perch lengthwise, not across the branch. The Egyptian Coucal (Centropus Ægyptius) is an example. They are all peculiar to the hotter portions of the Old World. The Malcohas (Phœnicophaus) seem to be confined to India and the adjacent islands. The bill is stout, longer than the head, and gently curved from the base; the side of the head, for a large space round the eye, is destitute of feathers, exhibiting a naked granulated skin. The wings are very short; the tail long and graduated. The Red-headed Malcoha of Ceylon (Phœnicophaus pyrrhocephalus) is an example.

Family PSITTACIDÆ (PARROTS).

Mr. Vigors, Mr. Swainson, and other naturalists, regard the parrots as constituting a family of the Scansorial order; but if structure and modes of life are to be taken as the grounds of arrangement, then the parrots will form as clear and distinct an order as the raptorial birds, or as the Natatores (swimming birds). Nor are we alone in this opinion. The Prince of Canino, in his 'Specchio generale,' places them in the order Psittaci, the first of his subclass Insessores; and M. de Blainville makes them the first order of birds, under the well-chosen title of Prehensores, belonging to the anomalous subclass. Even those ornithologists who, proceeding upon that most artificial of methods styled the natural, quinary, or trinary, have formed the parrots into a family group of the Scansores, have felt the dilemma in which they stood. Mr. Vigors declares it as his opinion that the Psittacidæ afford more difficulties to the inquirer into affinities than any other group in the known class; he remarks that in manners and general structure, as well as in the mode of using their feet and bill, the parrots hold nearly an insulated situation among birds, and that they may perhaps be pronounced to be the only group among them which is completely sui generis. Yet because the parrots and the woodpeckers are climbers, par excellence—differing, however, as he states, as to the mode in which they climb—he associates them together, and considers the Barbets (Pogonias) to be the link of union between them. The difference in the external characters of the head of the parrot, with its curved mandibles and fleshy tongue, and that of the woodpecker with its long beak and slender extensile tongue, may be seen in Fig. 1603. Mr. Swainson is of opinion that the parrots constitute the subtypical division of the Scansores, in which the powers of climbing are less developed. If, says that writer, "any group in nature be isolated, it is this. Possessing in themselves the strongest characteristics, there is no bird yet discovered which presents any point of connection to them; approximations are certainly made by the tooth-billed barbets, but still there is a gap which no genus discovered is calculated to fill up." If such a group, then, does not constitute an order, what does?

The order Prehensores, then, for so we would term it, or the Psittacidæ of authors, is divided by different naturalists into genera so numerous, that a mere list of them and their synonyms is enough to startlé the student, who would find himself bewildered in a labyrinth of names, tending to confuse him more and more at every step: avoiding them altogether, we may observe that the parrots may be arranged in the following groups or sections:—1, Cockatoos; 2, Macaws; 3, Parrakeets, including the Psittacaras, the true Parrakeets, the Loriets or broad tailed Parrakeets, the Lorikets or filamentous-tongued Parrakeets, the Ground Parrakeets, and the Psittacules; 4, the True Parrots; 5, the Lories.

1604.—A Group of Parrots.

This group of parrots is illustrative of some of the forms which these birds offer to the contemplation of the naturalist. Of the cockatoos, are, *a*, the Sulphur-crested Cockatoo (Plyctolophus Sulphureus, Vieillot); *b*, the Banksian Cockatoo (Calyptorhynchus Banksii, Vigors): and *c*, the Goliah Cockatoo (Probosciger Goliath, Kuhl) with naked cheeks. Of the macaws, is *d*, the great Red and Blue Macaw (Macrocercus Macao). Of the parrakeets, *e*, the Carolina Parrakeet (Conurus Carolinensis, Kuhl; *f*, the Scaled Parrakeet: *g*, the Black-winged Psittacule (Psittacula melanoptera); *h*, the Philippine Psittacule (Psittacula Philippensis). Of the parrots, *i*, the Accipitrine Parrot (Psittacus accipitrinus), and *k*, the White-headed Parrot (Psittacus leucocephalus).

In the parrot tribe, the modification of the bill is very remarkable. In many birds the upper mandible is more or less moveable at its junction with the forehead, for where there is no trace of a suture, the bone is often slightly elastic.* In the parrots, however, this mobility is carried out to its fullest extent, a sort of hinge uniting the upper mandible to the forehead (see Fig. 1605), while the slender bones connecting the upper mandible to the base of the skull yield to every movement. Across the horny palate of the beak is a sort of notch (see Fig. 1606), against which the front margin of the lower beak works, and this margin, chisel-like, is sharp and thin; while the articulation of the lower mandible is as loose as possible. Hence, aided by the thick fleshy tongue, a parrot, as we have often seen, will by means of its beak clear the inside of a fresh pea from the outer skin, rejecting the latter: and perform the whole process not only with facility but with the greatest delicacy of manipulation, if this term be allowable. In all birds, as a rule, the margin of the orbit is incomplete. In the parrot the bony ring varying in breadth is complete, and below it runs the slender bone connecting the upper mandible with the os quadratum (see Fig. 1605). The lower mandible is light, thin, and deep. The tongue is thick, muscular, and in constant requisition; it is covered with papillæ, is moistened with saliva, and possesses both taste and great mobility. In the lorikets (Trichoglossus) however, which feed on the nectar of the flowers of the Eucalypti in Australia, it is furnished with a brush of delicate close-set filaments.

We need not say that birds have no teeth, yet Geoffroy St. Hilaire, in his 'Theory of Analogues,' says, that though it may be considered a piece of pleasantry to assert that fowls have teeth, he finds proofs that such is the fact, notwithstanding the weight of authority against him. To this opinion he was led in the first instance by examining the beaks of two chicks of the ring parrakeet (Palæornis torquatus), which, though matured, had not been able to break through the egg-shell. In the beaks of these younglings he observed a regular set of tooth-like projections, or, as he states, teeth, represented at Fig. 1607. *a*, a lateral view of both mandibles showing the teeth: *b* and *c*, the upper and under mandible viewed, the first from beneath, the latter from above; *d*, the serrations or teeth on the beak of the blue macaw, which M. Geoffroy St. Hilaire subsequently observed, and which are more fully represented at Fig. 1608: *a*, the upper mandible; *b*, the lower insection to show the teeth; *c*, a portion of the beak, showing the serrations worn down by use. In the instance of the parrakeet chicks M. Geoffroy St. Hilaire could trace nerves and blood-vessels running towards each toothlet; but in the adult macaw, the tube in which these had apparently lain while the bird was a nestling was filled with a cartilaginous substance. The fact is that these are not real teeth, but only indications of a structure much more amply developed in the beak of the duck tribe, which is furnished with a series of horny laminæ acting as strainers, and perhaps as feelers, and which are part and parcel of the horny sheath of the osseous mandible (see Fig. 1609). *a*, the upper mandible of the shoveller-duck (Rynchapsis clypeata): *b*, the lower mandible of the common duck. These appendages in the duck are rather the analogues of the baleen plates of the whale, than of teeth; and in the parrot, as from examination we can testify, they seem rather to indicate the progressive growth of the horny beak in the upper mandible, and evidence the passage of nerves and blood-vessels to the edge of the lower. We have before us the skulls of several macaws and parrots, adult, of which the lower mandible has its horny edge very clearly marked; while the hooked palatal part of the upper, anterior to the notch, is marked with lines obliquely running from a central line, like arrow-heads repeated, the apex of each pointing backwards, thus— The nostrils in the parrots are seated in a membranous cere at the base of the upper mandible.

Often, as in the macaws (see Fig. 1610), the cheeks are covered with naked skin.

The foot of the parrot is completely zygodactyle and prehensile (see Fig. 1611); the tarsus is short, but stout, and the limb muscular; the toes are long and furnished with strong claws, and are formed expressly for holding or grasping any object which they can enclose. In climbing, the parrot uses its hooked beak, as well as its feet, and in feeding, it rests on one foot, holding the food to its beak with the other. Compare the foot of the parrot with that of the fowl, and of the water-bird (Fig. 1612), and the difference will be at once appreciated. The plumage of the parrots is in general richly tinted, and some species are superb; in all, and particularly in the cockatoos, the skin throws off a mealy powder, which saturates the feathers, and communicates to them somewhat of a greasy feel; this is the case with other birds also, as eagles and herons. The parrots are a noisy race, associating together in flocks, and feeding upon fruits, buds, seeds, &c.; they sleep crowded together, and are fond of pruning each other's plumage; they are monogamous, the pairs forming lasting associations; and they breed in the hollows of trees. With respect to powers of flight, they vary considerably; some fly slowly, but others wing their way with the greatest rapidity, and for a long continuance. It is to the warmer climates more particularly that these birds are confined; and they are abundant in the intertropics. In the southern hemisphere, however, they occur in temperate latitudes, while in the northern hemisphere they are rare beyond the tropic of Cancer; the Carolina parrot, in America, and some of the genus Palæornis in India, however, are extratropical. On the contrary, parrots occur in the southern extremity of America, throughout New Holland, Van Diemen's Land, New Zealand, and even in Macquarrie Island, in the fifty-second degree of south latitude.

Of all birds, parrots are the most susceptible of being rendered tame and familiar; and towards their protectors they often manifest great attachment, courting their notice and caresses; they are decidedly the most intelligent of the feathered race; and are quick in learning to repeat words, sentences, and tunes: they mimic the voices of other animals, the barking of dogs, the mewing of cats, and the crowing of poultry; their memory is retentive, and their ear is accurate. Individuals, however, differ in their qualifications, and some species are superior to others in the facility with which they learn their lessons, the grey parrot of Africa (Psittacus erythacus) being pre-eminent.

In the classical writings of antiquity we have several references to these birds, which appear to have been great favourites and in general request. Aristotle well described their tongue as resembling that of man, whence, as he conjectured, arose the facility with which they pronounced words or sentences. The Greeks were the first of European nations who became acquainted with birds of the parrot tribe, viz. some of the species of the Indian genus Palæornis (parrakeets); these from all accounts were introduced into Europe from India at the time of the Macedonian conquest; and having been once brought into Greece, the great demand for them, and the high prices for which they sold, rendered the importation of them a profitable speculation. Aristotle calls the parrot 'Ινδικὸν ὄρνεον, or Indian bird.

From Greece the parrot soon found its way to Rome, and became extravagantly admired. It was kept in cages of the most costly materials, nor was any price, however inordinate, deemed beyond its value. Until the time of Nero, the Romans were not acquainted with the parrots of Africa; but as that country became more known, these birds with other natural productions were sent to Italy; and most probably it was from that quarter that the numbers of the parrot race were imported which at a subsequent period supplied the luxury of Heliogabalus. Among other articles in the bill of fare detailed by Ælian as entering into the feasts of this emperor, are the combs of fowls, the tongues of peacocks and nightingales, the brains of flamingoes and thrushes, the heads of parrots and pheasants, and it is reported that with the bodies of the two latter he fed his beasts of prey.

In captivity the parrot lives long; instances are on record of individuals attaining the age of eighty or one hundred years. We know a green South American parrot said to have been ninety years in the family, and is still in good health.

From these general remarks we shall at once proceed to our pictorial specimens.

1613.—The Blue and Yellow Macaw

(*Macrocercus Ararauna*).—The macaws are natives of the warmer regions of South America, and are among the largest of the parrot race. They are easily domesticated, and become very gentle and familiar, but in their powers of imitation they fall very short of the true parrots and parrakeets; their natural cries are harsh, discordant, and piercing, and the few words they are occasionally taught to utter are pronounced in a disagreeable tone. The beak is of enormous size and strength; the cheeks are to a greater or less extent bare; the nostrils are concealed; the under mandible is very deep. The plumage is remarkable for gaudy colouring. The blue and yellow macaw is a native of Brazil, Guiana, and Surinam, tenanting the swampy forests along the banks of rivers, and generally living in pairs, though sometimes they assemble in large flocks. The food of this species consists principally of the fruit of a kind of palm abundant in humid or marshy places. On the wing the blue and yellow macaw is rapid, displaying great address and ease in its aërial movements, and is often seen skimming over the tops of the loftiest trees, the highest branches of which it selects for its roosting-place. Like the parrots generally, this macaw lays two white eggs in the hollow of a decayed tree; both sexes attend to the duty of incubation, and to the labour of rearing the young. Two broods are said to be produced annually.

The colouring of this species is as follows:—Bill black, cheeks naked, white, with three narrow lines of black velvety feathers passing obliquely across. Beneath the under mandible is a broad black band, extending some distance under the naked cheeks. General colour above rich blue, passing into green on the forehead, some of the wing-coverts, and rump. Greater quills and tail nearly violet; wings and tail beneath, yellow; under parts generally of a rich saffron tint; iris yellowish; legs dusky. Length about thirty-nine inchea, of which the long graduated tail measures about twenty-four inches.

---

* In the Rook, Hoopoe, Heron, Stork, Woodpecker, Shoveller-duck, Sacred Ibis, &c. the upper mandible is firm and immoveable, as also in the Albatros, Hornbill, and others.

1614.—The Red-Fronted Parrakeet-Macaw

(*Psittacara Leptorhyncha*). Between the Macaws and Parrakeets comes the genus Psittacara of Vigors, allied to the former in the shape and size of the beak, but to the latter in the cheeks being clothed with feathers, a naked ring only encircling the eye, and in the form of the tail. From their intermediate situation, the birds of this genus have received the familiar name of *Parrakeet-Macaws* in our language, and that of *Perruche-aras*, which has the same meaning, in the French. Like the macaws, these birds are exclusively natives of the New World; they are formed for rapid flight, and live in flocks, tenanting the forest. The present species is green, space round the eye white, a frontal band stretching from eye to eye red, tail cinnamon red.

An allied species, the Carolina Parrot (Psittacara Carolinensis), Conurus Carolinensis, Kuhl, is a native of the southern districts of the United States, frequenting the low alluvial lands along the Ohio and Mississippi, where the cockle-bur (Xanthium strumarium) grows in abundance, on the fruit of which it feeds, extricating the seeds from the prickly shells; it adds however grain, fruits, apples, mulberries, grapes, &c. to the bill of fare; and as it associates in flocks, the farmer often suffers from its depredations. It must not be supposed that these flocks commit their ravages with impunity; the gun thins their numbers; and as the living birds sweep screaming around their dead and wounded companions, and settle again in the place of danger, the whole flock is sometimes almost entirely extirpated. The flight of this species is rapid, graceful, and direct; and a general cry is kept up by the whole party while on the wing. The movements of these birds on the ground are slow and embarrassed, but on trees or tall strong plants they are very active, climbing about, and hanging in every attitude. They roost in hollow trees, and incubate in similar cavities, many females, as Mr. Audubon assures us, depositing their eggs together. From the same observer we learn that these birds are fond of saline earth, and visit the different salt-licks interspersed through the woods; they delight also in rolling themselves in the sand, for which purpose they often alight in flocks along the gravelly banks of rivers and creeks, and in other situations. It would appear that the adult plumage is not assumed until after the second year.

1615.—The Alexandrine Parrakeet

(*Palæornis Alexandri*). The genus Palæornis, containing a number of beautiful and interesting species, is confined, or nearly so, to India and its islands: Australia being just within the geographical range of the group. It was with some of the Indian species of this group that the ancients, as already noticed, became first acquainted. Mr. Vigors ('Zool. Journal,' vol. ii.), who observes that the ancient writers unanimously affirm that the parrots known in their times came exclusively from India, adds:—"It is not easy to decide, although we may form a tolerable conjecture on the subject, how many and which of the species of Palæornis were known to the ancients. Ælian (De Nat. Anim. xvi. 2) tells us that they were acquainted with three species: but as some of the more common species approach each other most closely in their specific characters, it is not improbable that the differences between them might have been passed over by observers who were so little accustomed and had so little occasion to pay attention to minute distinctions, and that four or five species at least were familiar to antiquity. The birds that came from the remoter Indian islands, P. Papuensis, Malaccensis, and Xanthosomus in particular, are in all likelihood among the number of those that have been known only in recent times: to these we may add the newly characterized species from New Holland, the P. Barrabandi. The beautiful blossom-headed species also, P. erythrocephalus, and P. Bengalensis, which are even now more rarely met with than the neighbouring species, most probably did not come under the observations of the ancients, for it is impossible that they should have passed over without notice the lovely and changeable roseate colour of the head, which casts into the shade even the collar round the neck (so frequently alluded to by them), if either of these birds had been before them. The poets at least would have seized upon a character which involved so truly poetic an image, and Ovid or Statius would have woven it up among the most conspicuous wreaths of their beautiful elegiac garlands. The species which we can imagine to have been best known to former times are the P. Pondicerianus and Flavitorquis, which are diffused over the whole of the Indian continent, the former species more particularly, which is now found dispersed over a great extent of the Eastern archipelago. P. Alexandri appears to have been the bird sent from Ceylon to the Macedonian warrior from whom it derives its specific name; Ceylon, or the ancient Taprobana, being the principal resort, even down to the present moment, of that species. It is probable also that the Romans, particularly in later times, received a great number of the same species from that island. If to these birds we add the P. torquatus, which is the species that agrees most intimately with the descriptions of Pliny, and after him of Apuleius, which is generally scattered over the Indian, as well as the African continent on the eastern side, we shall probably have before us all the species known to the ancients of this classical group." The Alexandrine Parrakeet is a beautiful bird; its general plumage is green, a vermilion collar adorns the neck, the throat and a band between the eyes are black, a mark of purple red ornaments the shoulders.

1616, 1617.—The Rose-ringed Parrakeet

(*Palæornis torquatus*). This beautiful species is probably that described by Solinus as "colore viridi, torque puniceo;" its colour is green, with a roseate collar, and the bill deep ruby. Besides being found in India, it is said to be abundant on the coast of Senegal. In captivity it is a gentle engaging bird, and soon learns to utter sentences with considerable distinctness.

In the genus Palæornis the bill is rather thick, the wings are moderate and pointed; the tail is slender and very graduated, the two middle feathers far exceeding the rest in length; the tarsi are short and feeble; the general contour is slim and graceful.

1618.—The Tabuan Loriet

(*Platycercus scapulatus*). King's-Ground Parrakeet, Grand Perruche à collier et croupion bleues, Le Vaillant.

In the genus Platycercus the bill is rather short, the upper mandible rounded and dilated, the lower one short, deeply emarginate, with the apex squared. Wings moderate and rounded; the tail broad, and subgraduate, the tarsi elevated; the toes slender and elongated; and the claws long and but little hooked. In their habits and manners the birds of this genus differ from the exclusively arboreal species; they run nimbly on the ground, with singular address, but their powers of flight are limited, and the os furcatum, or merry-thought, is either very feeble or wanting. While on the wing, however, their course is tolerably rapid, but is not long sustained. They breed in the holes of trees, and the females lay several eggs, from seven to ten or a dozen. Grass-seeds, grain, and hard fruits constitute their food; all are richly coloured, and, as they soon become familiar, are interesting ornaments in an aviary.

The present species, when adult, is green, with the head, neck, and under parts, scarlet; back of the neck and rump lazuline; longitudinal scapular line pale green cerulean; tail-feathers black, with brilliant green reflections. (Male).

We have frequently noticed the King's-Ground Parrakeet or Tabuan Loriet, in captivity. In a large cage, it may be seen rapidly traversing the sanded floor, and occasionally uttering a soft whistling note; like the rest of the genus, it is fond of the bath, and will saturate its plumage with water, which, from a mistaken idea of its being injurious, persons too often deny to their captives of the parrot tribe.

This beautiful species is a native of New Holland, associating in flocks, which, when the Indian corn is ripe, visit the fields, and occasion no little mischief. Mr. Caley considers these flocks as consisting of young birds almost exclusively, as it is rare to see a bright red bird among them. According to information gained from the natives, he adds that this bird breeds chiefly in a white gum-tree (one of the Eucalypti), making its nest in a hollow, of a little grass, and lining it with feathers. The eggs are as many as twelve, and are of a dirty white, with black specks. The natives easily detect the breeding-place of this bird; for as it enlarges the entrance, in order to creep in and out of the hole more readily, the surrounding part acquires a reddish tint in consequence of the operation, and contrasts very strongly with the whiteness of the rest of the tree. The species of the genus Platycercus are numerous; as the P. pacificus, Stanleyi, Pennantii, semitorquatus, Baueri, Barnardi, &c. Of the P. semitorquatus, Mr. Gould states that it begins breeding in the latter part of September or commencement of October, making no nest, but depositing its eggs in a hole in either a gum or mahogany tree, on the soft black dust collected at the bottom; they are from seven to nine in number, of a pure white. This species is dispersed over the greater part of Western Australia, "where it inhabits every variety of situation; sometimes searching for its food on the ground, like the rest of its congeners, at other times on the trees; its chief food being either grass-seeds or the hard-stoned fruits and seeds peculiar to the trees of the country in which it lives." From its note uttered while on the wing, it has acquired from the colonists the name of the Twenty-eight Parrakeet. (See Gould's 'Birds of Australia.')

1619.—The New Holland Nymphicus

(*Nymphicus Novæ Hollandiæ*). In the genus Nymphicus the bill is notched; the culmen slightly carinated; the nostrils thick, tumid, and naked; the wings long; the tail broad and graduated, the two middle tail feathers being much longer than the next, and pointed. We have had opportunities of observing the habits of the New Holland Nymphicus in captivity, one being in the possession of Mr. Gould, and we believe the only one ever brought alive to England. It is surprisingly active, and trips over the floor of its cage with great celerity, continually erecting its beautiful crest of pointed and graduated feathers; its manners, in fact, much resemble those of the Platycerci, but have more of sprightliness and vivacity. It is extremely gentle and familiar, and is fond of being noticed. This species is common in the interior of New Holland, associating in vast troops; and in some parts so great are their numbers, that, as Mr. Gould assures us, his brother-in-law, Stephen Coxen, Esq., procured upwards of two hundred examples during a single excursion in the interior.

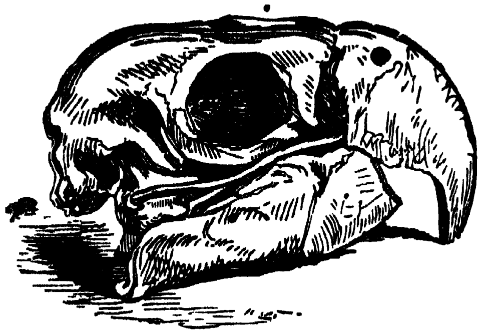
In the male, the forehead, crest, and cheeks are lemon-yellow; the ear-coverts, rich reddish orange; the back of the neck, the two central tail-feathers, and the external margins of the primaries brownish grey; back, shoulders, and all the under surface and outer tail-feathers greyish chocolate brown, the shoulders and flanks being the darkest. A white mark extends from the shoulders lengthwise down the centre of the wing; bill and bare space round the eye brownish grey; feet blackish brown. The female differs from the male in the colour of the face and crest, being of a dull olive yellow, the latter becoming still darker at its extremity; in having the throat greyish brown, and the back lighter than in the male; the lower part of the abdomen, upper tail-coverts, and tail-feathers yellow, except the four middle ones, which are grey; the whole transversely and irregularly barred with lines of brown. Total length twelve inches. (Gould).

1620.—The Undulated Euphemia.

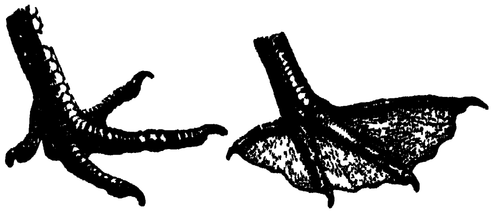
(*Euphemia undulata*). The genus Euphemia of Wagler (Nanodes, Vigors) has the bill short, with the culmen rounded, and the upper mandible deep; the wings of moderate length, and pointed; the tarsi and toes rather slender; the tail graduated; the two middle feathers being long and slender.

The undulated Euphemia is a native of the interior of New South Wales, where it was discovered in great abundance by Captain Sturt, who informed Mr. Gould that he met with it in immense flocks on the extensive plains bordering the Morumbidgee, feeding upon the seeds and berries of the low stunted bushes collectively named the 'scrub. Several specimens were received by Mr. Gould from Mr. Coxen, which had been procured by the latter north of Hunter's River. These beautiful little birds are quick and active, tripping along nimbly on the ground, and also flying with considerable rapidity; during flight the tail is spread, and the yellow mark is very conspicuous, as we have seen in Mr. Gould's living specimen, which is occasionally allowed the liberty of the drawing-room. This specimen is very familiar and observant, and while on its perch often breaks forth into a very sweet natural warble, occasionally interrupted by a shrill chirp. Its manners and beauty render it a most engaging creature; and it seems to bear our climate without any inconvenience.

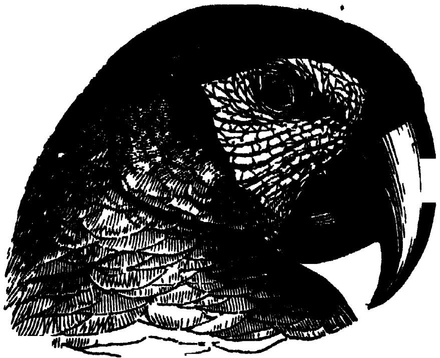
In the male the crown of the head and throat are pale yellow, the latter ornamented on each side with several rich blue spots; a row of which, but of a darker tint, crosses the throat in the form of a crescent; sides and back of the head, back of the neck, upper part of the back, scapulars, and wing-coverts olive brown, each feather having a crescent shaped mark of black near its extremity, and a margin of yellow; primaries green on their outer edges, the tip and internal web brown; secondaries crossed by a broad band of yellow, which is continued, but much narrower, across some of the primaries, breast and all the under surface, lower part of the back and tail-coverts of a fine pale green; the two centre tail-feathers deep blue at the base, passing into deep green at the tip; the remainder of the tail-feathers bright yellow, tipped



1605.—Skull of M



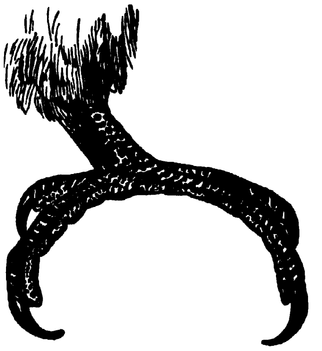
1612.—Foot of Parrot and of Water-bird.



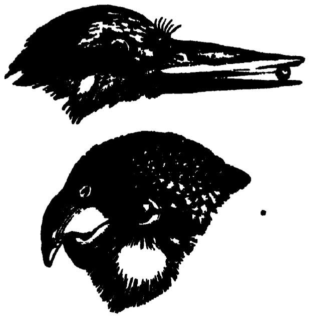
1610.—Head of Macaw

1614. Red fronted Parrakeet Macaw

1613.—Blue and Yellow Macaw



1611.—Foot of Macaw



1608.—Heads of Woodpecker and Parrot.

1617.—Tabuan Loriot.

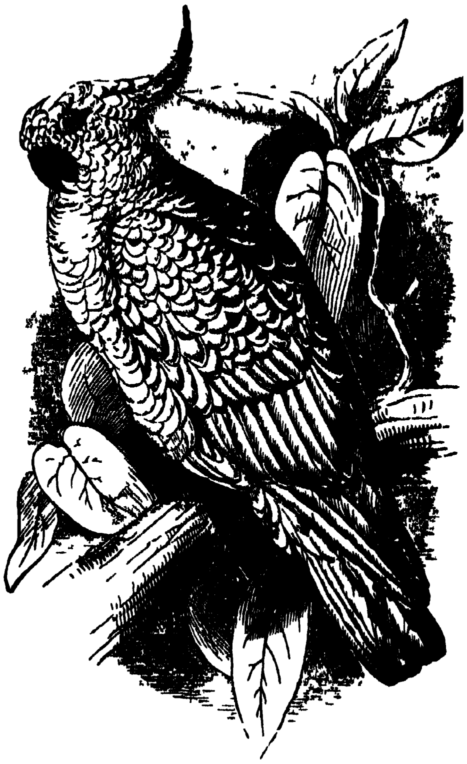
1615.—lexandrine Parrakeet.

1616.—Rose-ringed Parrakeet.

1620.—Undulated Euphemia.

1617.—Rose-ringed Parrakeet.

1619.—New Holland Nymphicus.



1623.—Great Sulphur crested Cockatoo

1622.—Purple-capped Lory.

1621.—Blue-Mountain Lorikeet.

1624.—Long-billed Parrot.

with dark green; bill horn-colour at the base, passing into pale yellow at the tip; feet flesh-colour. The female is less brilliant than the male, with more obscure markings, and the spots on the throat less defined. Total length seven inches and a half. (Gould, 'Birds of Australia.')

1621.—The Blue-Mountain Lorikeet

(*Trichoglossus hæmatodus*). Blue-mountain Parrot. The Lorikeets (Trichoglossi) are natives of Australia, and are principally characterized by the tongue being furnished at its apex with a pencil or brush of strong hairs, rendering it an efficient agent in procuring food. This consists of the nectar of various species of Eucalypti, some of which are always in flower, thus furnishing the flocks with an abundant supply; were it not for this succession of blooms, the lorikeets would be straitened for food. Among the pendent blossoms of these trees may the lorikeets be observed clinging in every attitude, and busily engaged in absorbing with their pencil-tufted tongues (and so licking up) the honey from the cups of the newly-expanded blossoms which they have compressed and nibbled with their beaks. To such an excess, says Mr. Gould, do these birds satiate themselves with their liquid food, that on suspending a fresh-shot specimen by the toes, a large tea-spoonful, at least, of honey will flow from the mouth; and he adds, "When we know this to be the natural food of this group, how can it be expected that the species can exist in captivity upon the hard seed or farinaceous diet so generally given as a substitute?" And we agree with him in thinking that if honey or liquid saccharine matter were afforded them, they might be kept in our cages and aviaries; and when it is considered that they are among the most elegant and beautiful of their race, that it is desirable for those who have the opportunity of making a series of trials.

According to Mr. Caley, the Blue-mountain Lorikeet, or Blue-mountain Parrot (War'rin of the natives), is remarkable for its docility and attachment to some people, whilst it is a perfect scold to others who may have teased or offended it. "Flocks of these birds," says this accurate observer, "may be seen in the Eucalypti trees, when in flower, in different parts of the country, but in the greatest number near their breeding-places. It does not eat any kind of grain, even when in a domesticated state. It is much subject to fits, which generally prove fatal; and it is rare to find an individual kept alive above a couple of years. One that I kept, on being shown a figure of a coloured plant, used to put its tongue to the flowers, as if with the intent of sucking them; and I have seen it make the same attempt with a piece of cotton furniture. The flesh of this bird is very good eating." Again, speaking of the Crimson fronted Parrakeet, Coolich of the natives (Trichoglossus concinnus), Mr. Caley states that it may be observed in large flocks sucking the Eucalypti flowers. He adds that, like the Blue-mountain Parrot, it is subject to fits which generally prove fatal, that it is seldom kept alive, and that its breath or some part about its head emits a very sweet odour. The natives told him that this species breeds in the hollow boughs of trees, scraping out the decayed mould, and making its nest of it. The eggs, he informs us, are green, without spots, and the number of young two. Of the small Parrakeet, Jerryang of the natives (Trichoglossus pusillus), he observes that this, like the Coolich, is seen in very large flocks in the Eucalypti trees when in blossom. "The natives," says he, "now and then bring in the young ones, but they seldom live long. I had three young ones for some time, which used to huddle together and give out a very pleasing note. They all died strongly convulsed, and nearly at the same time; the limbs were as stiff the moment life was extinct as if the body had become cold. The natives tell me that it builds in the hollow limbs of trees, making no other nest than of the decayed wood. It has four young ones. The eggs are white, and without spot."

The Blue-mountain Lorikeet is generally green; the head, the middle of the body, and bands on the sides being azure blue; and the throat, breast, and flanks orange crimson.

1622.—The Purple-capped Lory.

(*Lorius Domicella*). The Lories are natives of the Moluccas, New Guinea, and other eastern islands, and are characterized by a weak bill, and a brush-tipped tongue, as in Trichoglossus. It is however doubtful whether nectar constitutes their sole food, for they exist in captivity upon sopped bread and milk, appearing to be in health and vigour. Probably soft fruits form part of their natural diet. The plumage of these birds is extremely rich and gorgeous; the tail is broad and rounded; the wings moderate; the beak elongated and weak. In disposition the Lories are gentle and docile, and easily learn to articulate words or sentences. Among the most beautiful of the splendid group is this Purple-capped Lory; it is of an intense scarlet, with a yellow collar on the upper part of the breast: the top of the head is deep purple passing on the occiput into violet; the upper surface of the wings is green, becoming violet blue at the bend and margin; under surface of the wings violet blue, thighs azure, bill orange yellow. Length nearly twelve inches.

1623.—The Great Sulphur-crested Cockatoo.

(*Plyctolophus galeritus*, Vigors and Horsfield). Cacatua galerita, Vieillot; Crested Cockatoo, White.

In the Cockatoos the bill is strong, short, broad, with the upper mandible much curved; the head is ornamented with a folding crest; base of the under mandible frequently concealed by feathers. Wings long, tail even. Locality, Australia and the Indian Islands. These birds inhabit the woods, feeding on fruits and breeding in hollow trees; their cry is harsh, loud, and disagreeable, but they are readily tamed, and though not celebrated for their powers of imitation, are engaging from their gentleness and affectionate disposition. Their plumage is very powdery. They live long in captivity. An authenticated instance some time since came within our knowledge of a great sulphur-crested Cockatoo which attained to the age of 120 years. Mr. Gould, who, in his 'Birds of Australia,' has given a magnificent figure of the Cacatua galerita of Vieillot, observes that if we regard the white cockatoo of Van Diemen's Land and that of New Guinea as mere varieties of each other, this species has a more extensive range than most other birds. It is an inhabitant of all the Australian Colonies, both on the southern and northern coasts, but has not yet been seen on the western. "On a close examination of the specimens from the three countries above mentioned, a decided difference is observable in the structure of the bill, or rather perhaps a modification of the organ for the peculiar kind of food afforded by the respective countries. The Van Diemen's Land bird is the largest in every respect, and has the bill, particularly the upper mandible, less abruptly curved; the bill of the New Guinea bird is much rounder, and is in fact fitted to perform a totally different office from that of the white cockatoo of Van Diemen's Land, which I have ascertained by dissection feeds principally on the small bulbs of the terrestrial orchidaceæ, for procuring which its lengthened upper mandible is admirably adapted, while it is more than probable that no food of this kind is to be obtained by the New Guinea bird, the structure of whose bill indicates that hard seeds and nuts constitute the principal part of its diet. The crops and stomachs of those killed in Van Diemen's Land were very muscular, and contained seeds, grain, native bread (a species of fungus), small tuberose and bulbous roots, and in most instances large stones.

"As may be readily imagined, this bird is not upon favourable terms with the agriculturist, upon whose fields of newly sown grain and ripening maize it commits the greatest devastation; it is consequently hunted and shot down wherever it is found, a circumstance which tends much to lessen its numbers. It is still however very abundant, moving about in flocks varying from a hundred to a thousand in number, and evinces a decided preference to the open plains and cleared lands, rather than to the dense brushes near the coast. Except when feeding or reposing on the trees after a repast, the presence of a flock, if not seen, is certain to be indicated by their horrid screaming notes, the discordance of which may be slightly conceived by those who have heard the peculiarly loud, piercing, grating scream of the bird in captivity, always remembering the immense increase of the din occasioned by the large number of the birds uttering their disagreeable notes at the same moment; still I ever considered this annoyance amply compensated for by their sprightly actions and the life their snowy forms imparted to the dense and never-varying green of the Australian forest; a feeling participated in by Sir Thomas Mitchell, who says that amidst the umbrageous foliage forming dense masses of shade the white cockatoos sported like spirits of light."

This bird builds in hollow trees and the crevices of rocks; the eggs are two, and of a white colour. The aborigines of New South Wales term this bird Car'away and Cur'riang; the Papuans of New Guinea, Mangarape.

General plumage white; occipital crest sulphur-yellow; ear coverts, under surface of wings, and basal portion of the inner webs of the tail-feathers, very pale sulphur-yellow. Length about eighteen inches.

1624.—The Long-billed Parrot.

(*Nestor productus*, Gould). The generic character of this singular bird consists chiefly in the elongation of the upper mandible of the beak, which is formed for digging in the earth; the wings are long and ample, the tail moderate, with the shafts of each feather projecting beyond the webs. The species is a native of Norfolk Island and the most eastern portions of New South Wales. "Like all the other members of this extensive family," says Mr. Gould, in his splendid work on the 'Birds of Australia,' speaking of this species, "it bears captivity remarkably well, readily becoming cheerful and contented; at least such is the case with an individual in the possession of Sir J. P. Millbank, Bart.; and as might have been reasonably expected, the variation in the form of the mandibles, which renders these birds so conspicuous, is accompanied by a marked difference in the nature of their food, the powerful bills of the other members of the family enabling them to feed upon hard seeds and stony fruits, while, from the elongated form of this organ in the present birds, this power is denied to them, and we find that they give a decided preference to the leaves of succulent plants and the softer kinds of fruit. Sir J. P. Millbank informed me that the bird in his possession evinced a strong partiality to the leaves of the common lettuce and other soft vegetables, and that it was also very fond of the juice of fruits, of cream, and butter. Its voice was hoarse and inharmonious, frequently resembling the barking of a dog; and in Yates's 'New Zealand' we are informed that the Nestor hypopolius, known there by the name of Kaka, is 'capable of learning to imitate the human voice to a remarkable degree. . . . . . The cry of this bird when ranging at large in the woods is harsh and disagreeable in the extreme.' Although I cannot assert it for a certainty, I have every reason to believe that both these birds frequently descend to the ground and grub up with their lengthened bills the bulbous and other roots which form a portion of their food, particularly as I have found earth still adhering to the mandibles of the specimens I have examined; besides which, I have been informed by Captain Sturt that a parrot inhabiting Australia, having a similar bill, but belonging to another group, is frequently in the habit of so doing. General colour of the upper surface brown; beak elongated; head and back of the neck tinged with grey; the feathers of these parts, as well as of the back, margined with a deeper tint; rump, belly, and under tail-coverts, deep red; cheeks, throat, and chest yellow, the former tinged with red; shoulders on their inner surface yellow, tinged with rufous olive; tail feathers banded at the base with orange-yellow and brown, the inner web of the quill-feathers at the base beneath with dusky red and brown; bill brown; feet blackish brown. Total length fifteen inches." (Gould, 'Birds of Australia.')

1625.—The Taranta Psittacule.

(*Psittacula Taranta*). The Psittacules and Love-Birds (Psittacula and Agapornis) form a group of most beautiful little parrakeets, the most diminutive of their race, with short rounded tails. They are natives of the torrid zone. The common love-bird from Guinea is well known, being often kept in cages in pairs; it is very interesting to witness the attention which a pair of these birds pay to each other, caressing each other, arranging each other's plumage, and by numberless little acts of kindness evidencing their mutual attachment. They usually sleep suspended with the head downwards, clinging by one foot alone. The colour of the love-bird (agapornis pullaria) is green, the outer webs of the quill-feathers being blue, and the tail banded with a bar of lilac.

The Taranta Psittacule is a native of Abyssinia, and was noticed by Salt about the Pass of Taranta, whence it takes its name. The bill is crimson; the forehead scarlet; the plumage green, lighter beneath; down the centre of the wing a broad black patch glossed with blue; quills dusky, fringed with green; two centre tail-feathers tipped with black, the rest crossed near the tip with the same.

Family CERTHIADÆ (CREEPERS).

Cuvier places the creepers (les Grimperaux) among the Tenuirostral section of the Passerine order, as does also the Prince of Canino, while Mr. Vigors and Mr. Swainson refers this family to the Scansores; the former ornithologist regarding it as a link between the woodpeckers (Picidæ) and the Tenuirostral group, viz., honey-suckers, honey-eaters, sun-birds, humming-birds, &c.

The creepers are birds structurally adapted by means of their large feet and strong claws for climbing about the trunks of trees, or the precipitous face of rocks, or steep banks, in quest of insect food: in general the beak is elongated, but in some it is moderate and strong; the toes are not zygodactyle. A reference to our pictorial specimens will at once lead us to an appreciation of the characters of the family.

1626, 1627.—The Creeper.

(*Certhia familiaris*). Common Creeper, Tree-creeper, Tree-climber; probably the Κίρθιος of Aristotle; le Grimpereau of the French; Picchio piccolo, Pichietto, and Rampichino of the Italians; Baumlaufer, Kleinere Grau-specht, and Kleinste Baum-häcker of the Germans; Krypare of the 'Fauna Suecica;' and y Grepianog of the ancient British.

The creeper is very common in our island, and appears to have a wide range through the Old World; an allied species (Certhia Americana, Bonaparte), till recently considered as identical with the European, is found in the western and northern regions of America. The creeper is a fearless little bird, common in groves and orchards, where it may be observed spirally running up the stems of trees like a mouse, and using the sharp shafts of its tail-feathers as a prop or aid in its ascent; it is searching for food, and if closely watched may be seen probing with its slender bill the various chinks and crevices of the bark, whence it extracts the lurking insect. Having finished its examination of the stem of one tree, the upper part of which it has rapidly attained, it does not attempt to descend, but flits away to the next, and clinging to the bark, re-commences its scrutiny and spiral ascent. The note of this bird is weak and monotonous, and is frequently repeated, especially during flight from tree to tree, or while stationary. This interesting little bird, one of the smallest of our native feathered race, breeds early in the spring; its nest is placed in the hole of some decayed tree, and is composed of dried grass and fibres of bark, lined with feathers; the eggs are from seven to nine in number, ash-coloured with dusky spots. The creeper has the shafts of the tail-feathers prolonged and stiff; and this character is still more developed in the American genus Dendrocolaptes, but is lost in the genus Tichodroma.

1628.—The Wall-Creeper

(*Tichodroma phænicoptera*, Temm.) T. muraria, Bonap.; Certhia muraria, Linn.; Grimpereau de muraille, and Pic de muraille, Ternier, and Eschelette of the French; Picchio muraiolo and Picchio di muro of the Italians; Mauer Baum-laufer of the Germans.

This elegant bird is a native of the mountain districts of middle and southern Europe, but is not indigenous in our island. It frequents the bold precipitous rocks of the Alps, the Apennines, and Pyrenees; and, according to the Prince of Canino, it may sometimes be seen creeping on the walls of St. Peter's at Rome: the hoary ruins of castles and other buildings which top the frowning heights of alpine scenery are attractive localities; there it flits from crag to crag, from crevice to crevice, not creeping mouse like, as does our little certhia, up the bark of trees, but taking short flights from point to point; assiduous in quest of insects, and especially spiders and their eggs, which are stated to be a favourite food. From the difference in habits between this bird and our creeper we can at once account for the absence of stiff springy shafts in the feathers of the tail. This bird is rather a clinger than a climber; it flits from projection to projection, securing itself by its claws, which are remarkably large and powerful; Temminck says that what the creeper does on trees, this bird does against the precipitous faces of rocks, where it firmly fixes itself, but without mounting or descending by creeping.

The wall-creeper breeds in the cliffs of inaccessible rocks, or in the crevices of ruins which beetle above the tremendous precipice.

The general colour of this bird is delicate grey; the shoulders and larger wing-coverts being lively crimson, as are also the inner edges of the secondary quill-feathers; the rest of the quill-feathers are black, as is the tail, which is marked at the extremity with white. In the male the throat during the spring acquires a deep black colour, lost at the autumnal moult. The beak is long, gently arched, and pointed; the wings are rounded. Length six inches and a half.

1629.—The Curve-billed Creeper

(*Dendrocolaptes procurvus*, Temm.) This bird, as the character of the claws and the stiff pointed shafts of the tail-feathers sufficiently indicate, is a decided climber. It is a native of the forests of Brazil. The bill is about an inch and three quarters long, rather strong, and considerably curved; the claws are hooked and channelled; the tongue is short and cartilaginous. In size this creeper equals a common blackbird. The general colour is cinnamon-brown, with a tinge of grey about the head, which, as well as the neck, is spotted with white. Of its habits we have no explicit details. It now forms the type of the genus Xiphorhynchus.

1630, 1631.—The Nuthatch

(*Sitta Europæa*). This is in all probability the Sitte (Σίττη) of the Greeks, and Sitta of the Latins. It is the Ziolo, Picchio grigio, Raparino, and Picchio formicajo of the Italians; Muratore of Savi; Torchepot and Pic-maçon of the French; Kleiber and Blauspecht of the Germans; Notwacka and Notpacka of the Swedes; Spœtt-meise of the Danes; Nat-Bake of Brunnich; Klener, Nusszhacker, of Kramer; and Delor y cnau of the ancient British.

The genus Sitta is characterised as follows:—Bill straight, cylindrical, slightly compressed, subulated, acuminated. Tongue short, horny, and armed at the point. Nostrils basal and rounded, partly hidden by reflected bristles. Feet with three toes before and one behind, the outer toe being joined at its base to the middle; one hind toe of the same length as or longer than the middle one, with a long and hooked claw. Tail of twelve feathers. Wings rather short; the first quill very short, the third and fourth the longest. (Gould.)

The nuthatch is found throughout Europe generally, and in the central wooded countries it is tolerably abundant; it inhabits many parts of our island, but, according to Selby, is not seen farther north than the banks of the Wear and Tyne: Montagu observes that it is not to be met with in Cornwall. In a note in his paper 'On the Birds of Ireland,' Mr. Thompson says that "this species is not known ever to have visited the island." ('Ann. and Mag. Nat. Hist.,' March, 1842, p. 501.)

The habits of the nuthatch are partly those of the creeper, and partly of the woodpeckers, yet differing in several particulars. The tail affords no support to this bird, yet it climbs well, not only ascending and winding round the trunks of trees, but descending with the utmost facility head foremost, which neither the creeper nor the woodpecker attempts; and on flying from tree to tree, it usually alights with the head downwards, and in that position works at the shell of the nut it is endeavouring to break. We had once an opportunity of observing a small colony of these interesting birds, in a limited wood (if it deserved the name) of very old trees, near Macclesfield in Cheshire; the underwood consisted of wild raspberries and hazel. These birds were constantly in motion, flying from tree to tree, and travelling round the thick branches, or about the gnarled and prominent bark surrounding holes formed by decay, ever and anon uttering a clear whistling note; we observed them take insects, and search for them in the fissures of the bark; but neither saw nor heard them hammering at nuts, for these, the season being spring or the early part of summer, were not matured. Nuts, however, form a portion of their diet, and the strokes made by the bird while endeavouring to extract the kernel may be heard at a considerrble distance. It fixes them in some chink or cleft, and splits the shell with repeated blows. Mr. Selby says that "in autumn many of these broken nut-shells may be seen in the open bark of old trees, in places where these birds abound, as they return repeatedly to the same spot for this purpose."

The nuthatch breeds in the holes of time-worn trees, and occasionally selects the deserted habitation of a woodpecker. According to Colonel Montagu and other observers, if the hole be too large, the bird plasters up a part with mud, so as to reduce the aperture to the needful size, thus preventing the intrusion of larger birds, or perhaps, as a writer has suggested, forming a sort of guard, so as to hinder the impatient nestlings from falling out, and being killed on the spot. This habit of plastering is alluded to in one of the French names for the nuthatch, viz., Pic-maçon. The female makes a nest of a few dry leaves, and lays from five to seven eggs of a grey white, spotted with reddish brown; she defends her young charge with determined courage, hissing, and striking violently with her bill.

The nuthatch is a bold bird, of almost untameable disposition, and will not endure confinement. An instance of its perseverance and spirit is recorded in the 'Magazine of Natural History:'—One of these birds, which had been winged by a sportsman, was put into a small cage, made of oak and wire. During a night and day he never ceased from his efforts to escape, except to devour food, which he did voraciously, regarding those about with fearless familiarity. No sooner was his meal finished than he recommenced his hammering, which is described as having been peculiarly laborious, for he did not peck as other birds do, but taking a firm grasp with his great feet, he turned upon them as upon a pivot, striking with his whole weight, and thus assuming with his body the appearance of the head of a hammer in motion. This unfortunate bird sank at the close of the second day under the combined effects of his vexation, assiduity, and voracity. The Rev. T. L. Bree mentions one which he caught in a common brick trap: when the bird was found, the bill appeared to be truncated, and he inferred that it had been fairly ground down to about two-thirds of its original length by the pecking of the bird at the bricks in its efforts to escape.

The plumage of the nuthatch above is of a fine blue grey. The quills and base of tail-feathers, except the two middle ones, black, the outer tail-feather on each side with a black spot near the tip. A black band passes from the bill through the eye down the sides of the neck, ending abruptly near the shoulders; throat whitish; rest of plumage below rufous brown blending into chestnut on the flanks: bill and feet black; iris hazel. Sexes alike.

1632.—The Oven-Bird

(*Furnarius rufus*). The genus Furnarius includes several species, which have a doubtful place among the Certhiadæ. Mr. Darwin, in his notice of the 'Birds of Bahia Blanca,' says with respect to the genus in question, that "it contains several species, small birds living on the ground, and inhabiting open dry countries. In structure they cannot be compared to any European form; ornithologists have generally included them among the creepers, although opposed to that family in every habit. The best known species is the common Oven-bird of La Plata, the Casara or House-maker of the Spaniards, and Furnarius rufus of Vieillot. The nest, whence it takes its name, is placed in the most exposed situations, as the top of a post, a bare rock, or a cactus: it is composed of mud and bits of straw, and has strong thick walls; in shape it precisely resembles an oven or depressed bee-hive; the opening is large and arched and directly in front; within the nest there is a partition which reaches nearly to the roof, thus forming a passage or ante-chamber to the true nest." Mr. Darwin notices another species of Furnarius called Casarita, or Little House-builder, which constructs its nest at the bottom of a narrow cylindrical hole, which is said to extend horizontally underground to the extent of six feet, and which the bird itself excavates in low banks of firm sandy soil by the side of a road or stream. Another species, the Furnarius fuliginosus of Lesson, is described as living upon the beach of the Malouine Islands, and as being very fearless. Pernetty says, "This bird is so tame that it will almost fly upon the finger; in less than half an hour I killed ten with a small switch, and almost without changing my position. It scratches in the seaweed which the waves throw on the beach, feeding on worms and small shrimps. . . . Its flight is short: its habits are solitary."

Mr. Darwin observed a small dusky Furnarius distinct from the last, common in Chonos Archipelago. He says, "It is remarkable for its quiet, tame habits. It lives entirely on the sea-beach, and there, as well as sometimes on the floating kelp, picks up small sea-shells and crabs, thus supplying the place of a sandpiper." The birds of this genus apparently form the type of a distinct family.

1633.—The Climacteris

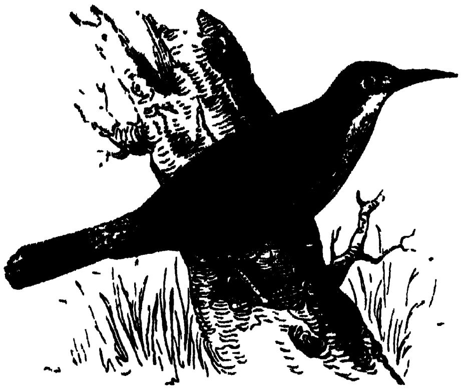
(*Climacteris Picumnus*). This genus holds also a doubtful place among the Certhiadæ. It is thus characterised by Temminck:—Bill short, weak, very much compressed throughout its length, but little curved, oval shaped; mandibles equal, pointed; nostrils basal, lateral, covered by a naked membrane. Feet robust: tarsi of the length of the middle toe, which, as well as the hallux, are extraordinarily long; claws large and curved, channelled on the sides, subulate, very much hooked; external toe united up to the second articulation, the internal toe as far as the first; lateral toes very unequal. Wings moderate; first quill short, second shorter than the third, which last and the fourth are the longest.

Of this genus two species were known, C. Picumnus and C. scandens, and Mr. Gould has recently added two new ones. All are natives of Australia. They are excellent climbers, traversing the hollow limbs, or spouts, as they are usually termed, of aged Eucalypti, and the rugged bark of decayed trees, in quest of insects, on which they prey. They incubate in the holes of trees, and the eggs are white. For an account of the species we refer to Mr. Gould's magnificent work on the Birds of Australia, now in the course of publication.

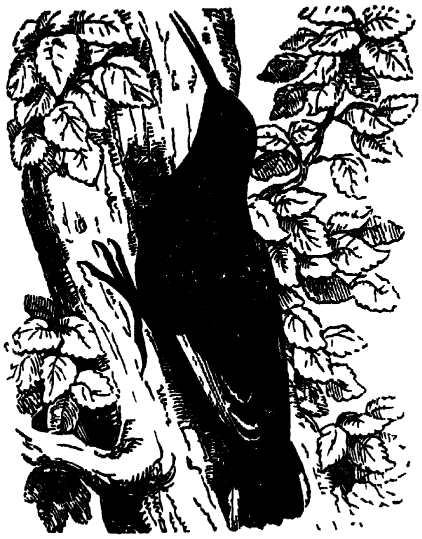
The Climacteris Picumnus is a native of the north coast of Australia, Timor, and the Celebes. Its colouring is as follows:—Summit of the head deep grey; nape and neck bright grey. Wings and two middle feathers of the tail brown; a large nankeen-coloured band passes nearly through the middle of the quills. Tail-feathers black, except at their origin and extremity. Throat and cheeks dirty white. Breast grey. Feathers of the lower parts white in the middle, bordered with brown. Lower coverts of the tail Isabella-colour, marked with transverse brown spots. Length six inches six lines. (Temm.)

1634.—The Spine-tailed Orthonyx

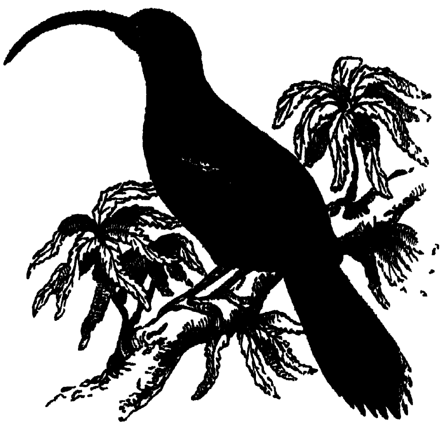
(*Orthonyx spinicaudatus*, Temm.). Orthonyx Temminckii, Vigors, 'Linn. Trans.' The Orthonyx appears to be closely related to Climacteris; but though its tail be spine-tipped (the stiff shafts passing beyond the broad part of the feathers), it is far less arboreal in its habits than that species; its claws, indeed, though large and strong, are but slightly curved, and therefore but little adapted, upon the principle of grappling-irons, for clinging



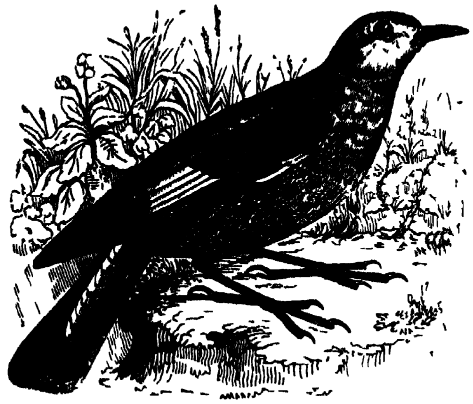
1632.—Oven Bird.



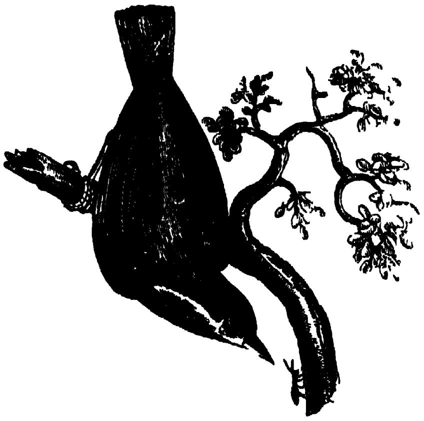
1628.—Wall Creeper.



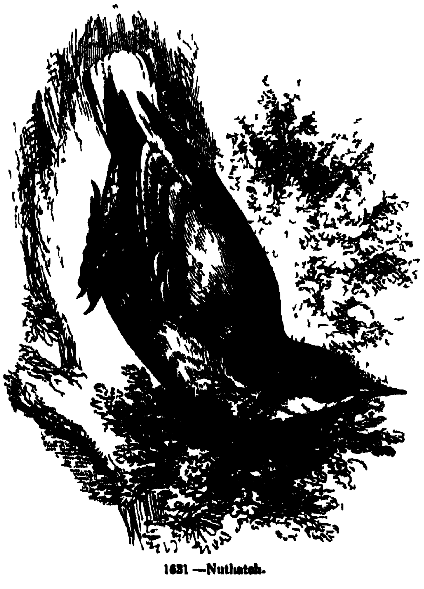
1629.—Curve-billed Creeper.



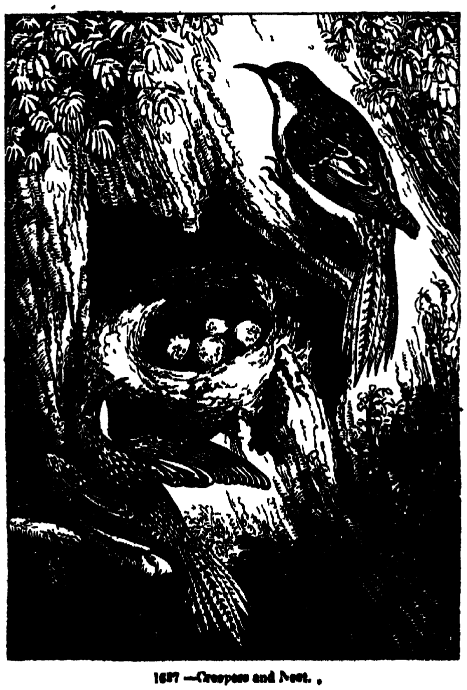
1633.—Climacteris.



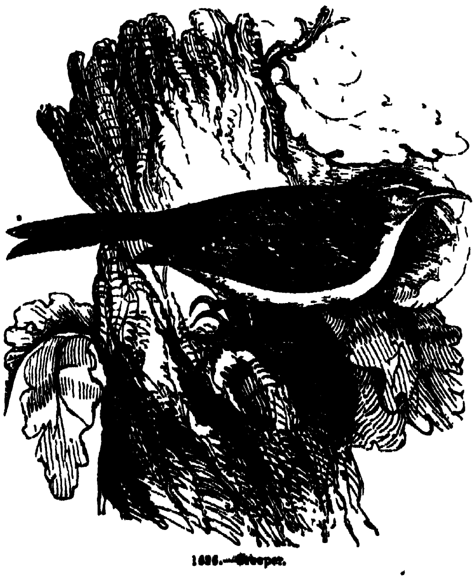
1630.—Nuthatch.



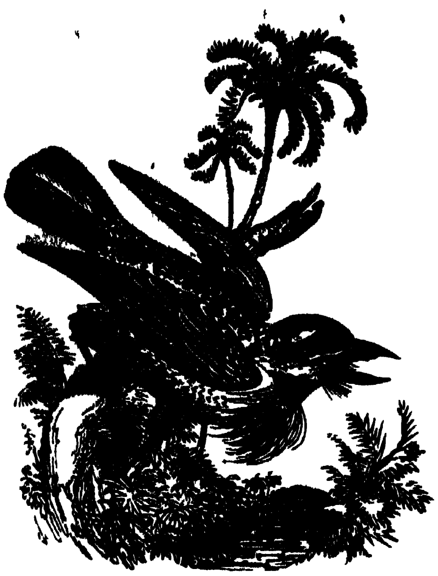
1631.—Nuthatch.



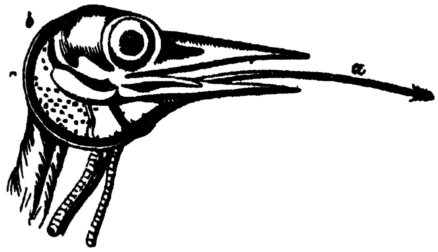
1627.—Creepers and Nest.



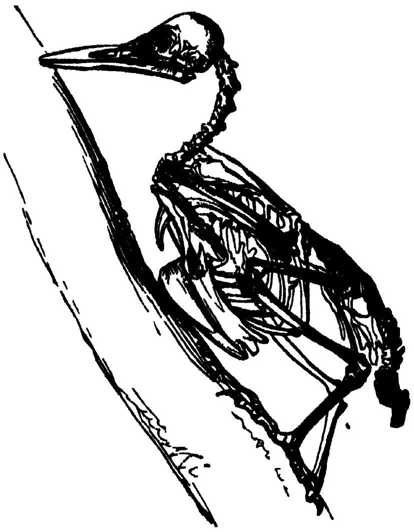
1626.—Creeper.



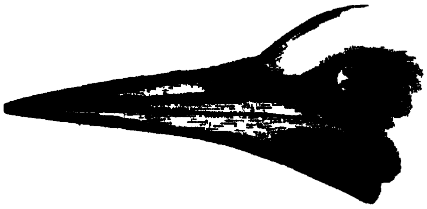
1635.—Bristly Barbet.



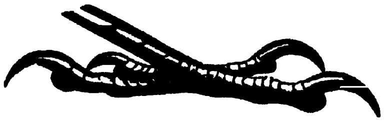
1642.—Head of Woodpecker



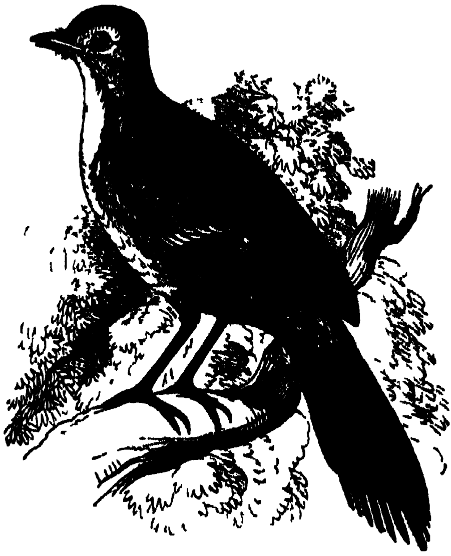
1638.—Skeleton of Woodpecker



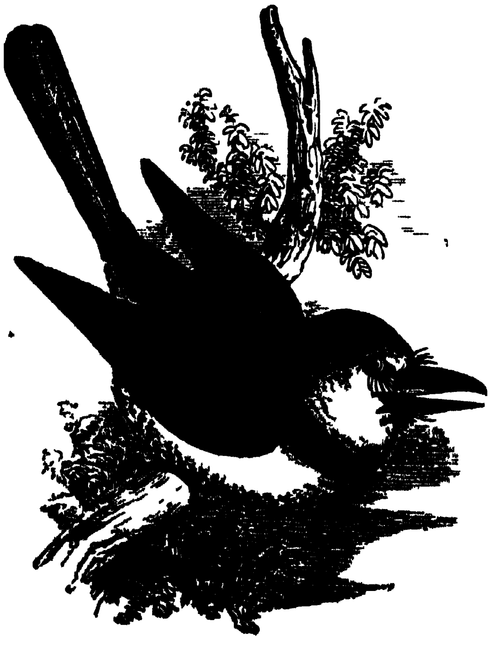
1640.—Beak of Great Black Woodpecker



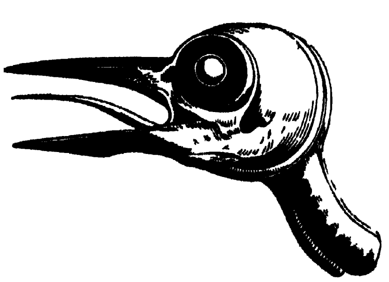
1639.—Foot of Woodpecker



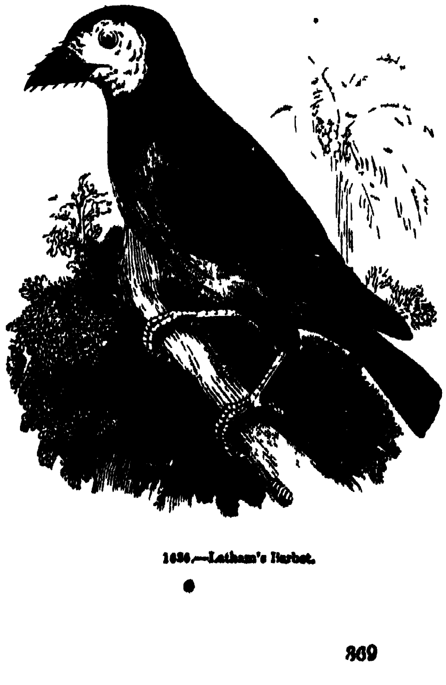
1634.—Spine tailed Orthonyx.—Upper figure, female; lower,



1637.—Great-billed Puff-Bird.



1641.—Head of Woodpecker



1636.—Latham's Barbet.

tenaciously to the bark of trees. The orthonyx is in fact a ground-climber: it frequents rough banks, broken plots of ground, and similar localities, which it explores, traversing the irregularities of the ground, and the mouldering trunks of fallen trees, in quest of coleopterous insects, which appear to form its chief food. In its progress it is greatly assisted by its tail, which is generally found to be considerably worn, as in the specimens Mr. Gould has kindly permitted us to examine. This bird is a native of Australia, and, according to M. Lesson, of New Zealand; but Mr. Gould has proved, by dissection, that traveller to be wrong respecting the sexes: M. Lesson says that the throat of the male is orange-coloured, that of the female white; the reverse is the case.

The general colour is a rusty brown above, lineated with black; the lesser wing-coverts are grey streaked with brown; the tail is dusky brown, with the stiff shafts prolonged beyond the webs. In the male the throat and upper part of the breast is white: in the female rufous orange. The bill is short and stout, compressed at the sides: the wings are rounded; the feet large and strong; the tarsi elevated, in accordance with terrestrial habits; the feathers of the top of the head are capable of being elevated and depressed at pleasure. Size that of a lark. Of the two figures, the lower is the male, the upper the female.

Family PICIDÆ (WOODPECKERS, &c.)

The birds of this family are essentially scansorial; their feet are adapted for clinging to the bark of trees, and they ascend the stems and branches with the greatest facility. Their food, for the most part, consists of insects, which they search for in the crevices and underneath the bark of unsound trees, or in the very wood of such as exhibit symptoms of decay; fruits, however, are not altogether excluded.

The first group of this family to which we shall direct our attention is that of the Barbets. The barbets are distinguished by the beak being large, conical, swollen at the sides of its base, and garnished with five tufts of long bristles, one on each side over the nostrils, one at the angle of the gape on each side, and one under the lower mandible. The wings are short, the general proportions heavy, and the flight low. They live on insects and fruits, and breed in the holes of trees. They are indigenous in both continents, and associate for the most part in small flocks, which separate during the breeding-season into pairs. Many of the barbets are richly coloured; such as the Bucco grandis, a native of China and the range of the Himalayan Mountains. This group of scansorial birds is divided into various genera, as Pogonias, Bucco, and Tamatia.

1635.—The Bristly Barbet

(*Pogonias hirsutus*). The genus Pogonias is characterised by the beak being furnished with one or *two strong teeth on each side of the upper mandible; the bristles of the beak are very strong.* The species are found in India and Africa; and, according to Cuvier, subsist more exclusively on fruits than do the other barbets.

The bristly barbet is a native of Africa, and is remarkable for a bunch of bristle-like feathers on the chest. The throat, head, and neck are deep black, passing on the upper surface of the body, the wings, and tail into dark brown; the general plumage being spotted and marked with sulphur-yellow. The under parts are greenish sulphur, thickly spotted with dusky black. Length seven inches.

1636.—Latham's Barbet

(*Bucco Lathami*). The Buff-faced Barbet. This species is an example of the genus Bucco, in which the bill is conical, slightly compressed, and a little elevated in the middle. The species are found in Asia and Africa. The buff-faced or Latham's barbet is of a dark olive-green, paler beneath, with the forehead and sides of the head round the eyes of a full buff-colour. Length six inches.

1637.—The Great-billed Puff Bird

(*Tamatia macrorhynchos*). In the genus Tamatia (Capito, Temminck) the beak is more elongated than in the preceding genera, and more compressed, with the upper mandible curved downwards at its tip. The large head, the short tail, and great beak of these puff-birds give them, says Cuvier, an air of stupidity. In their habits they are melancholy and secluded. All the recorded species are American, and are said to live exclusively on insects. (See Cuvier, 'Règne An.')

The Great-billed Puff-bird is a native of Brazil, and is considered by Swainson to be identical with the greater Pied Barbet of Latham. This bird in its habits much reminds us of the flycatchers (Muscicapidæ). Mr. Swainson ('Zoological Illustrations') gives the following interesting account of the manners and disposition of these birds, which he had an opportunity of studying in their native regions: "There is something very grotesque in the appearance of all the puff-birds; and their habits, in a state of nature, are no less singular. They frequent open cultivated spots near habitations, always perching on the withered branches of a low tree; where they will sit nearly motionless for hours, unless, indeed, they descry some luckless insect passing near them, at which they immediately dart, returning again to the identical twig they had just left, and which they will sometimes frequent for months. At such times the disproportionate size of the head is rendered more conspicuous by the bird raising its feathers so as to appear not unlike a puff-ball: hence the general name they have received from the English residents in Brazil, of which vast country all the species, I believe, are natives. When frightened, this form is suddenly changed by the feathers lying quite flat. They are very confiding, and will often take their station within a few yards of the window. The two sexes are generally near each other, and often on the same tree."

The length of this species is about eight inches. Plumage black and white, except the belly and vent, which are tinged with buff.

Leaving the Barbets, we come to the true Woodpeckers, birds pre-eminently scansorial, and formed for traversing the trunks and branches of trees. The woodpeckers are widely distributed, being found alike in Europe, Asia, Africa, and America, each region having its peculiar species; they do not, however, exist in Australia. If we look at the skeleton of the woodpecker (Fig. 1638) we shall at a glance perceive the adaptation of the whole of the osseous structure to the habits of the living animal: the shape of the head and bill, the arched form of the neck, and the sudden angle which the cervical vertebræ make with the dorsal, remind us of a hammer with a long handle fixed to a sort of hinge on which the machine works, and we no longer wonder at the force which the bird displays as it shivers the bark with repeated blows. The breast-bone, merrythought, and wing-bones are small and feeble. The woodpecker is not a bird of vast powers of flight; but look at the bones of the legs; mark their strength, their length, and the acute angles they make with each other as the bird rests in its natural attitude. To say that the muscles acting on these bones have great power and are voluminous, is what they themselves declare; the limb is indeed constructed for tenacity of grasp and rapidity of action. In the woodpecker the spiny tail is of great importance. We find the pelvic portion of the skeleton developed, the caudal vertebræ large, the last bone particularly so; and the whole bends downwards in such a manner, that the points of the tail-feathers are pressed against the surface over which the bird is proceeding. The structure of the toes and claws is worth especial attention (Fig. 1639). The feet are zygodactyle; and *the toes exceeding the tarsus in length, are strong, robust, and armed with sharp curved claws; the outermost (that is, the longest) of the two hind-toes is directed rather obliquely than completely backwards*, and the two anterior toes diverge considerably, so as to spread over an area as extensive as possible in order that their grasp may be the more effectual and secure,—a point of great importance to the bird while ascending the trunk or limbs of trees, but still more so while, exerting all its force, it is hammering at the bark, or scooping out a hole for its nest.

From the feet we proceed to the beak (Fig, 1640). This in the more typical forms, as the Great Black Woodpecker, is one of the most efficient instruments *possible for splitting* and *chipping* bark or decayed wood. It is immensely strong and thick at its base, whence it narrows to a hard compressed tip, which is abruptly squared off, and sharp like a minute chisel. Nor must the structure of the tongue be omitted; it is a flexible probe and feeler, and an organ of prehension; its length is very extraordinary, unless, with Blumenbach, we regard the horny apex only as the true tongue; and it is capable of being protruded and retracted with singular rapidity. It is lubricated with a viscid saliva, and its tip (the true tongue of Blumenbach) is horny, firm, and barbed on each side with a series of spines directed backwards. This instrument it launches forth with a rapid motion, inserting it into crevices where the insects lodge, and into their cells or mazy retreats which it has laid open with its beak, and there catching them on the barbed point, which is moreover covered with an adhesive secretion, it draws them instantaneously into the mouth. The mechanism by which the protrusion and retraction of the tongue are effected is very beautiful, and well worth attention. Figs. 1641, 1642, 1643, show the head of the woodpecker in different stages of dissection. Fig. 1643 is the most complete, and is thus described by Sir Charles Bell: "*a* is the barbed tongue: *b* two slender elastic ligamentous cartilages of a very peculiar nature and use; at one extremity they are attached to the bone which supports the upper mandible, from this we trace them over the skull, down upon the sides of the neck, and with a large sweep turning under the lower mandible, and so continued into the tongue, not terminating till they reach the horny point, *c c c*, a long muscle which follows these ligamentous cartilages, upon their concave side, arising from the bone of the lower mandible, and so sweeping round with the cartilages and over the skull to have another fixed point at the upper mandible: these protrude the tongue. Two muscles are seen to arise from the sides of the larynx (windpipe), which are the opponents of the last and retract the tongue. Leaving the other parts of the anatomy, let us direct our attention to the action of the muscle *c c c*, which presents one of those curious instances observed in comparative anatomy, of a mechanism adapted to a particular purpose. The tongue is not only thrust out far by this apparatus, but is shot with great rapidity in correspondence with its barbed point. This effect is produced by the two extremities of the muscles being fixed points, and the fibres of the muscle itself running on the concave side of the cartilaginous bow so as to form a smaller circle. We require no mathematical demonstration to prove that the tongue must be thrust out to a greater distance than the measure of contraction of the muscle.

"Let us tie up the line of the fishing-rod to its slender top, and pull upon it at the butt; the motion of the top will be very extensive when only an inch of the line is drawn through the rings. This is a pretty accurate representation of what takes place by the contraction of this protruding muscle. We have noticed that the upper end of this arch is fixed, the whole motion, therefore, must be given to the loose extremity in the tongue; and we cannot but observe that this peculiar arch and muscular ring are adapted for the rapid protrusion of the tongue; whilst its retraction is produced by a common muscle, that is, a muscle running in a straight course. Another curious part of this apparatus is, that a very large gland, which pours out a glutinous matter, is embraced and compressed by the action of the circular muscle; this viscid secretion, bedewing the tongue, furnishes additional means for the bird to pick up insects, such as ants, without the necessity of sticking each with its arrow. Nothing can be more mechanical or more happily adapted to its purpose, than the whole of this structure; indeed it is not inferior to the means employed for giving rapidity to the membrana nictitans of the eye of the bird."

In Fig. 1642, *a* represents the tongue; *b* one of the protruding muscles; and *c* its accompanying elastic spring: which is in fact a continuation of the os hyoides modified for a particular purpose.

It has been said by some, that the woodpecker transfixes insects upon its barbed tongue; such, as far as our observations go, is not the case; they adhere to it by means of the glutinous saliva, and are prevented from becoming disengaged by means of the barbs which act like those of the burr (calyx of the burdock, arctium lappa).

Buffon has condemned the whole group of woodpeckers as degraded, miserable beings. According to him the narrow circumference of a tree circumscribes their dull round of life, and on this they are constrained to drag out an insipid existence in boring the bark and hard fibres, in order to extract their prey; and thus they lead a mean and gloomy life: *nor is their appetite ever softened by delicacy of* taste. When Buffon wrote this he must have been thinking of the bond-slaves, or serfs of France under *the old régime; it is very inapplicable to the* active, restless, noisy, animated woodpeckers, ever on the alert, flitting from tree to tree, and busy on their appointed labours. The Picidæ or Woodpeckers are sub-divided into numerous genera or sub-genera, as indeed, in the present day, are most groups of birds; so much so, indeed, that the study of ornithology (we may say zoology) is merging into a study of barbarous nomenclature: we shall soon have a distinct genus for every species; and this is called science.

1644.—The Great Black Woodpecker

(*Picus martius*). Dryocopus martius, Boié; Le Pic noir, Buffon. This fine bird is the largest of its European congeners, being in length about seventeen inches. In England it is a bird of very rare occurrence, barely claiming a place in the catalogue of our British Fauna. Its native regions are the northern and eastern parts of Europe, as far as Siberia. In the forests of Russia and some parts of Germany it is common. It breeds, like the rest of its race, in the deep holes of trees, which are hewed out by the power of its bill, sometimes even in the solid undecayed wood. The eggs are three or four in number, and white. The whole of the plumage is glossy black, with the exception of the crown, which in the male is rich vermilion. The female is duller,

and has either no vermilion on the head or only a small patch.

1645.—THE IVORY-BILLED WOODPECKER

(*Picus principalis*). Campephilus principalis, G. R. Gray.

The ivory-billed woodpecker is a native of North America; Wilson says that in strength and magnitude it stands at the head of the whole class of woodpeckers hitherto discovered: but he was not aware, when he wrote, of the existence of a species in California, which "as far exceeds the ivory-billed woodpecker of the United States as the latter does the great black woodpecker of Europe." This bird is described by Mr. Gould, in the 'Proceeds. Zool. Soc.' 1832, pp. 139, 140, under the term of Picus imperialis: it is two feet in length; while the ivory-billed woodpecker does not exceed 20 or 21 inches.

It is in the swampy forests of the southern districts of the United States that the ivory-billed woodpecker is to be found; in the middle districts there are no woods suitable to its remarkable habits. "Descending the Ohio," says Audubon, "we meet with this splendid bird for the first time near the confluence of that beautiful river and the Mississippi; after which, following the windings of the latter, either downwards towards the sea or upwards in the direction of the Missouri, we frequently observe it. On the Atlantic coast, North Carolina may be taken as the limits of its distribution, although now and then an individual of the species may be accidentally seen in Maryland. To the westward of the Mississippi, it is found in all the dense forests bordering the streams which empty their waters into that majestic river, from the very declivities of the Rocky Mountains. The lower parts of the Carolinas, Georgia, Alabama, Louisiana, and Mississippi, are, however, the most favourite resorts of this bird; and in those states it constantly resides, breeds, and passes a life of peaceful enjoyment, finding a profusion of food on all the deep, dark, and gloomy swamps dispersed throughout them."

Beetles, larvæ, and large grubs constitute the chief diet of this species, and for these it attacks the bark and wood of decayed trees, its strokes resounding far through the gloomy wilds. "Wherever he frequents," says Wilson, "he leaves numerous monuments of his industry behind him; we there see enormous pine-trees with cart-loads of bark lying around their roots, and chips of the trunk itself in such quantities as to suggest the idea that half a dozen axe-men had been at work there for the whole morning. The body of the tree is also disfigured with such numerous and so large excavations, that one can hardly conceive it possible for the whole to be the work of a woodpecker." Audubon says he has seen it detach pieces of bark seven or eight inches in length at a single blow, busy in quest of insects, all the while sounding its loud notes as if highly delighted. Sound and healthy trees, however, are never thus attacked excepting for the purpose of nidification. The tree selected for this purpose is either an ash, or a hagberry; and at a great elevation, the pair, relieving each other by turns, begin their operations. They generally select a spot under the junction of a large branch with the trunk, as a defence against rain: they first excavate horizontally for a few inches, and then downwards, the extent of the cavity varying from a foot to three feet downwards into the core of the tree; the diameter is about seven inches, but the aperture will only just admit the bird. The eggs, generally six, are white. Two broods are usually reared each summer. Besides insects, this woodpecker devours wild grapes, persimons, and hagberries. The flight of this species is very graceful, though, as Audubon says, seldom prolonged to more than a few hundred yards at a time, unless when it has to cross a large river, which it does in deep undulations; but the transit from tree to tree is performed by a single sweep. It seldom utters any sound while on the wing, but as soon as it alights its voice is heard, the notes resounding to a considerable distance, and may be represented by the monosyllable *pait, pait, pait*, in tone like the false high note of a clarionet.

The head and bill of this species are held in great esteem, as a sort of charm or amulet, by many of the tribes of America, who ornament their belts with them; and Europeans purchase them as beautiful curiosities. When wounded, this bird generally ascends the nearest tree in a spiral direction, till it attains the top branches, where it hides; but if intercepted and laid hold of, it defends itself both with its beak and claws, inflicting severe lacerations.

The general colour of the plumage of the present species is black with violet reflexions; the head is ornamented with a crest of long slender feathers capable of being raised or depressed, and in the male of a rich carmine; a stripe of white passes down each side of the neck, and terminates on the scapulars; the primary quills, except the five first, are tipped with white, and the secondaries are wholly white; the bill is ivory-white. The female resembles the male, except in the colour of the crest, which is black.

1646.—THE RED-HEAD WOODPECKER

(*Picus erythrocephalus*). This beautiful, active, and lively bird is also a native of the United States of America, and is a migratory species, retiring to southern latitudes on the approach of winter, though many continue during that season in the states of New York and Pennsylvania, and especially Carolina. In the summer this species abounds in the woods, and even close to the precincts of towns and cities, and seems to be but little afraid of man. "When alighted on a fence stake by the road or in a field, and one approaches them (says Audubon), they gradually move sideways out of sight, peeping now and then to discover your intention; and when you are quite close and opposite, lie still until you are passed, when they hop to the top of the stake, and rattle upon it with their bill, as if to congratulate themselves on the success of their cunning. Should you approach within arm's length, which may frequently be done, the woodpecker flies to the first stake or the second from you, bends his head to peep, and rattles again, as if to provoke you to continuance of what seems to him excellent sport. He alights on the roof of the house, hops along it, beats the shingles, utters a cry, and dives into your garden to pick the finest strawberries he can discover." No birds are more destructive in gardens; they devour fruit of all kinds as it ripens, completely stripping the trees; they carry away to their retreat apples, peaches, cherries, strawberries, &c.; and as they visit the garden in scores, or even hundreds, they soon clear it. They attack the Indian-corn while in its succulent milky state; and also rob the nests of small birds of their eggs. To this luxurious bill of fare may be added insects, for which they search with singular dexterity and intelligence, drawing them from their retreats in the crevices of old trees and beneath the mouldering bark. "No sooner have they satisfied their hunger, than small parties of them assemble on the tops and branches of decayed trees, from which they chase different insects that are passing through the air, launching after them for eight or ten yards, at times performing the most singular manœuvres; and on securing their victim return to the tree, where immediately after a continued cry of exultation is uttered. They pursue each other on wing in a very amicable manner, in long beautifully curved sweeps, during which the remarkable variety of their plumage becomes conspicuous, and is highly pleasing to the eye. When passing from one tree to another, their flight resembles the motion of a great swing, and is performed by a single opening of the wings, descending at first, and rising towards the spot on which they are going to alight, with ease and in the most graceful manner."

Like the rest of this tribe, the Red-head, as it is generally called, breeds in the holes of trees which it has worked out, and to which the pair resort year after year, making it only a little deeper. It is not however, in hard living trees that this species often attempts to make its breeding-chamber. Audubon says he does not remember even a single instance of such an occurrence.

Wilson observes, that terrible enemy of the feathered race in North America, the black snake (Colubra constrictor), destroys numbers of the young of this bird. "It glides up the trunk of the tree, and, like a skulking savage, enters the woodpeckers' peaceable apartment, devours the eggs or helpless young, in spite of the cries or flutterings of the parents, and, if the place be large enough coils himself up in the spot they occupied, where he will sometimes remain for several days." The plumage of this lively "frolicsome bird" is very beautiful. The head and neck are bright crimson; back, wing-coverts, primaries, and tail-feathers black, with blue reflexions; rump and secondaries white, the shafts of the latter black; breast and under parts white tinged with yellowish brown; an irregular transverse band of black between the crimson of the neck and the white of the breast. Length nine inches.

1647.—THE YELLOW-BELLIED WOODPECKER

(*Picus varius*). This species extends in America from Cayenne to Hudson's Bay: during the summer it tenants the depths of the forests remote from villages or settlements, where it breeds and rears its young: in the month of October it quits the forest and approaches the farms and villages, frequenting orchards, not for the sake of fruit, but of insects, in quest of which it bores the trunks of apple-trees. In general habits it resembles the rest of its tribe, but is much more shy than the red-head.

The colouring of this elegant woodpecker is thus detailed:—the crown of the head a rich deep scarlet, bordered with black on each side, the feathers of the occiput forming a slight crest, which the bird often erects; from the nostrils, which are thickly covered with recumbent hairs, a narrow strip of white runs downwards, curving round the breast and mixing with the yellowish white on the lower part of the breast; throat the same deep scarlet as the crown, bordered with black proceeding from the lower mandible on each side, and spreading a broad rounding patch on the breast. This black in birds of the first and second year is dusky grey, the feathers being only crossed with circular touches of black; a line of white, and below it another of black, proceed the first from the upper part of the eye, the other from behind the eye, and lose themselves on the neck and back. Back dusky yellow, sprinkled and elegantly waved with black; wings black with a large oblong spot of white; the primaries tipped and spotted with white; rump white bordered with black; belly yellow; sides under the wings more dusky yellow, marked with long arrow-heads of black; tail black with white markings; legs greenish blue. Length nine inches and a half. The female is marked nearly the same as the male, but wants the scarlet on the throat, which is whitish. The young of both sexes have the crown sprinkled with black and scarlet in October.

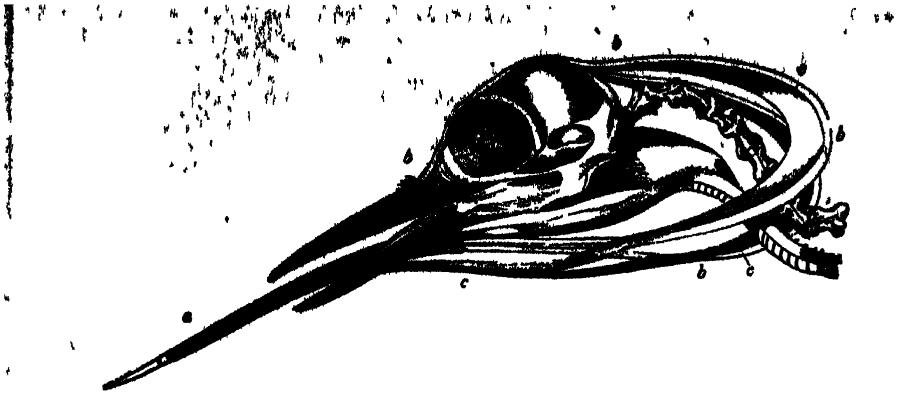
1648.—THE HAIRY WOODPECKER

(*Picus villosus*). This species, remarkable for the great mass of hairs that cover the nostril, and the hairy quality of the feathers on the back, is another of the species peculiar to North America, and is common in orchards during the autumn and winter, where it bores the bark of the trees, the decayed wood of palings, mouldering logs, &c., in search of insects and their larvæ. In the month of May it usually seeks the forest with its mate, and either appropriates a hollow already made, or digs one for the reception of the eggs. In the latter case, according to Wilson, it first works horizontally for the distance of six or eight inches, and then obtusely downwards for twice that distance, carrying up the chips with the bill and scraping them out with its feet. Not unfrequently they choose large orchards as their summer residence, working out their asylum in the stem of apple-trees or old stakes. Wilson states that their cry is strong, shrill, and tremulous, and that they have also a single note or *chuck*, which they often repeat in an eager manner as they hop about and dig into the crevices of the tree. The top of the head and a broad stripe behind the eye black; occiput scarlet; touches of black from the angle of the mouth to a broad black mark before the shoulder; upper plumage generally black with two dorsal lines of white and white bars on the wings; the under parts white. Length nine inches. The female wants the red on the occiput, which is characteristic of the adult male.

1649.—THE DOWNY WOODPECKER

(*Picus pubescens*). In general habits, manners, and colouring this species resembles the hairy woodpecker, but is much smaller, measuring about six inches and a half in length. It is a native of North America, frequenting orchards and the neighbourhood of farm-houses, and is stationary throughout the year. About the middle of May, says Wilson, the male and female look out for a suitable place for the reception of their eggs and young. An apple, pear, or cherry tree is generally selected for this purpose. "The tree is minutely reconnoitred for several days previous to the operation, and the work is first begun by the male, who cuts out a hole in the solid wood as circular as if described by a pair of compasses. He is occasionally relieved by the female, both parties working with the most indefatigable diligence. The direction of the hole, if made in the body of the tree, is generally downwards, by an angle of thirty or forty degrees for the distance of six or eight inches, and then straight down for ten or twelve more: within it is roomy, capacious, and smooth as if polished by the cabinet-maker. But the entrance is judiciously left just so large as to admit the bodies of the owners. During this labour they regularly carry out the chips, often strewing them at a distance to prevent suspicion. This operation sometimes occupies the chief part of a week. Before she begins to lay, the female often visits the place, examines every part both of the exterior and interior with great attention, and at length takes complete possession. The eggs are generally six, of a pure white, and laid on the smooth bottom of the cavity. The male occasionally supplies the female with food while she is sitting, and about the last week in June the young are perceived making their way up the tree, climbing with considerable dexterity."

The note of this active, familiar, little bird is a single chink frequently repeated. "Of all our woodpeckers," says the admirable writer already quoted, "none rid the apple-trees of so many vermin as this; digging off the moss which the negligence of the proprietor had suffered to accumulate, and probing every crevice. In fact the orchard is his favourite resort in all seasons, and his industry is incessant. In the fall, he is particularly fond of



1643.—Head of Woodpecker, dissected.

1649.—Downy Woodpecker.

1645.—Ivory-billed Woodpecker.

1644.—Great Black Woodpecker.

1646.—Red-head Woodpecker.

1647.—Yellow-bellied Woodpecker.

1648.—Hairy Woodpecker.

1650.—Great Spotted Woodpeckers

1654.—Shore's Woodpecker

1656.—Chilian Woodpecker

1657.—Caffre Woodpecker

1652.—Green Woodpeckers.

1651.—Lesser Spotted Woodpeckers.

[illegible].—Scaled Woodpecker.

boring the apple-trees for insects, digging a circular hole through the bark, just sufficient to admit his bill; after that, a second and a third, and so on, in pretty regular horizontal circles round the body of the tree: these parallel circles of holes are often not more than an inch or an inch and a half apart, and sometimes so close together that I have covered eight or ten of them at once with a dollar. From nearly the surface of the ground up to the first fork, and sometimes far beyond it, the whole bark of many apple-trees is perforated in this manner, so as to appear as if made by successive discharges of buck-shot; and this little woodpecker is the perpetrator of this supposed mischief. I say supposed, for, so far from these perforations of the bark being ruinous, they are not only harmless, but, I have good reason to believe, *really beneficial* to the health and fertility of the tree. In more than fifty orchards which I examined myself, those trees which were marked by the woodpecker (for some trees they never touch, because perhaps not penetrated by insects) were uniformly the most thriving, and seemingly the most productive. Many of these were upwards of sixty years old, their trunks completely covered with holes, while the branches were broad, luxuriant, and loaded with fruit. Of decayed trees more than three-fourths were untouched by the woodpecker. It is principally during the autumn and winter months that this species thus bores in quest of the larvæ of insects, which, if suffered to remain unmolested, would ultimately destroy the tree; one check to their increase, appointed by nature, is the little downy woodpecker.

1650.—The Great Spotted Woodpecker.

(*Picus major*). Le Pic varié, and Pic Epeiche, Buffon; Die Bunt-specht, Becht, Bechstein.

This species is one of our British birds, and, though not very abundant, is found in all our wooded districts. In Ireland it is rare. On the continent it is widely diffused, and in the northern latitudes is most probably migratory. Mr. Selby says that in Northumberland there is an influx of these birds, as he suspects, from Norway and Sweden; they arrive with the woodcock, generally after stormy weather from the north or north-east. In its habits the great spotted woodpecker resembles the rest of his race, feeding on insects, berries, and fruits; it rarely descends to the ground, but traverses the trunks and branches of trees with the greatest address, and excavates a deep hole for the purpose of incubation. During the spring and throughout the breeding-season this bird utters a jarring noise, the call both of the males and females to each other.

The colouring is as follows:—Forehead greyish white; crown of the head black; occiput fine crimson; cheeks and ear-coverts white; general colour of the upper surface black, proceeding from a streak running from each corner of the lower mandible, and arching forwards on the chest, inclosing a patch of white on each side of the back of the neck; scapulars and part of the adjoining wing-coverts white; quills barred with white; the four middle tail-feathers black, the rest more or less white, and spotted near the tip with black; under surface white. The female wants the red occipital band. The young on quitting the nest have the crown of the head red and the occiput black, in which state, as Mr. Selby states, they have been mistaken for the Picus medius, a species not found in England.

1651.—The Lesser Spotted Woodpecker

(*Picus minor*). Le Petit Epeiche, Buffon: Pic Epeichette, Temminck; Grass-pecht, Bechstein.

In all its habits and manners this beautiful little species is a true woodpecker. It is generally diffused through Europe, and in Germany gives preference to the forests of fir-trees. In our island it is partially distributed, being in some places very common, but in the northern counties it is rare.

"In England," says Mr. Gould, "it is far more abundant than is generally supposed: we have seldom sought for it in vain wherever large trees, particularly the elm, grow in sufficient numbers to invite its abode: its security from sight is to be attributed more to its habit of frequenting the topmost branches than to its rarity. Near London it is very common, and may be seen by an attentive observer in Kensington Gardens, and in any of the parks in the neighbourhood. Like many other birds whose habits are of an arboreal character, the lesser spotted woodpecker appears to perform a certain daily round, traversing a given extent of district, and returning to the same spot whence it began its route. Besides the elm, to which it is especially partial, it not unfrequently visits orchard-trees of large growth, running over their moss-grown branches in quest of the larvæ of insects, which abound in such situations. In its actions it is very lively and alert. Unlike the large woodpecker, which prefers the trunks of trees, it naturally frequents the smaller and more elevated branches, which it traverses with the utmost ease and celerity: should it perceive itself noticed, it becomes shy, and retires from observation by concealing itself behind the branch on which it rests; if, however, earnestly engaged in the extraction of its food, its attention appears to be so absorbed that it will allow itself to be closely approached without suspending its operations. When spring commences, it becomes clamorous and noisy, its call being an oft-repeated note, so closely resembling that of the wryneck as to be scarcely distinguishable from it. At other times of the year it is mute, and its presence is only betrayed by the reiterated strokes which it makes against the bark of trees." ('Birds of Europe.')

The forehead is greyish white; the crown of the head is rosy red: streak over the eye, occiput, and nape of the neck black; cheeks and sides of the neck white; from the corners of the lower mandible a black streak proceeds downwards towards the shoulder; upper part of the back and lesser wing-coverts glossy black; middle of the back and scapulars white barred with black; quills black spotted with white; tail-coverts and four middle tail-feathers black; upon the rest the black decreases to the outer feather, which is white, except a black spot near the tip; under parts greyish white, with a few dusky spots upon the sides of the breast. In the female the crown of the head is white. (Selby.)

1652.—The Green Woodpecker

(*Picus viridis*). Gecinus viridus, Boié: le Pic vert, Buffon; Grunspecht, Bechstein; Woodspite, Rain-bird, Hew-hole, Yappingall, Yaffer, Popinjay, Provincial English.

Of our limited number of British woodpeckers this is certainly the most common; it is, however, very doubtful whether it extends to Ireland. On the continent of Europe it is widely spread, inhabiting forests and wooded districts, where its loud cry may be often heard, the bird itself unseen. This cry, when frequently uttered, is commonly supposed to foretell the approach of rainy weather; hence one of its English provincial names. In some of its habits this species differs from the woodpeckers generally, especially in often leaving the trunks of the trees for the ground, where it searches for ants'-nests, being extremely partial to these insects and their larvæ, which it picks up very dexterously by means of its long tongue. In this respect it agrees with the golden-winged woodpecker of America (Colaptes auratus), a most beautiful and interesting species, regarded by Mr. Vigors as the type of the ground woodpeckers. It must not be supposed however, that the green woodpecker seeks its food only on the ground; it searches for insects on the bark of trees, or in the decaying wood, which it shivers easily by blows with its strong wedge-shaped bill. It scales the trunks with great rapidity, ascending either straight up or in a spiral manner; it also readily descends, not, however, head-foremost, but tail foremost, moving as it were backwards. Its flight is rapid and undulating, the wings being opened and shut at every stroke; and in flying from trunk to trunk, if the trees are not very far apart, it takes only a single sweep.

The green woodpecker works out a deep excavation either in a tree undergoing the process of decay or in one of the softer kinds of wood, carrying it often to a considerable depth. The aspen, according to Mr. Selby, is often selected. When engaged at its laborious task, the strokes are so rapid and repeated with such velocity, that the head appears in an incessant vibration, while the strokes resound to a considerable distance. The eggs, five in number, are of a bluish white.

In the spring this species utters a jarring sound, which appears to be the call of the sexes to each other. The feathers round the base of the bill and round the eyes black; crown of the head and a moustache mark from the root of the bill blood-red, the base of the feathers being bluish grey: upper surface generally green, passing on the rump into gamboge-yellow; under parts yellowish grey with a tinge of green; quills barred with dusky black and yellowish grey; tail blackish brown barred with green. In the female the red on the head is less conspicuous, and the moustaches are mostly black.

1653.—The Scaled Woodpecker

(*Picus squamatus*, Vigors). This species is a native of the Himalayan Mountains, and is figured in Mr. Gould's 'Century.' It was first described in the 'Proceeds. Zool. Soc.' 1831, p. 8. Above green, the rump yellowish; throat greenish grey; top of the head scarlet; a stripe above and below the eye greenish white, bounded, the first above and the latter below, by a large dash of black; under parts greenish scaled with black; quills and tail-feathers brownish black barred with white. We have no account of its habits.

We have described the woodpeckers as zygodactyle, that is, as having two anterior and two posterior toes; but there is a group in which the innermost of the hinder toes is wanting, the total number of the toes being only three. These tridactyle woodpeckers, termed Picoides by Lacépède, Apternus by Swainson, have the bill remarkably broad and flattened; and, sometimes at least, the tarsi are partially covered with feathers. The species of this group are not confined to one quarter of the globe; there are Indian, European, and American examples. Of the former we may mention the Picus Tiga of Horsfield, to which the following is closely allied.

1654.—Shore's Woodpecker.

(*Apternus Shorii*). Picus Shorii, Vigors. This species, a native of the forests of the Himalaya Mountains, and figured by Mr. Gould, in his 'Century,' was first characterized in the 'Proceeds. Zool. Soc.' 1831, p. 175. Of its habits we have no details. It is named after its discoverer the Hon. F. J. Shore, of the East India Company's Civil Service. General colour orange green; the head with a scarlet crest; back scarlet; a stripe behind each eye, and another from the angle of the lower mandible, black; under parts white; the back of the neck, the quills, and tail-feathers black; the top of the breast greyish brown; the breast and abdomen marked with black scale-like spots. Length, twelve inches.

1655.—The Three-toed Woodpecker

(*Apternus tridactylus*, Swainson). Picoides tridactylus, Lacépède. In Bonaparte's 'Comparative List of the Birds of Europe and N. America' are distinguished three species of three-toed woodpeckers: one (A. tridactylus), a native of Northern and Central Europe; and two (A. hirsutus and A. arcticus), natives of the northern parts of America. Of these latter, the A. arcticus has till lately been regarded as identical with the European species. An allied species, viz., the A. undulatus, is a native of Guiana. In habits and manners these tridactyle species resemble the ordinary woodpeckers, climbing the bark with the greatest facility, and feeding upon insects.

The three-toed woodpecker inhabits the forests of the northern and eastern portions of Europe as well as those of Asia. It is very abundant in Norway, Russia, and Siberia, and is common also in the Swiss Alps; but rare in France, and even Germany, and never seen in Holland. It is not known in our island. According to Temminck, in the Alpine regions it never passes an elevation of 4000 feet above the level of the sea, its range there being restricted to the forests at the base of the mountains, and to the wooded valleys. With respect to its North American representative (A. arcticus), it exists, according to Dr. Richardson, in all the forests of spruce-fir lying between Lake Superior and the Arctic Sea: and that north of the Great Slave Lake it is the most common species of woodpecker. He also states that it much resembles the hairy woodpecker in its habits, except that it seeks its food principally on the decaying trees of the pine-tribe, in which it frequently makes holes of considerable size and depth. It does not migrate. According to M. Temminck, the American bird differs from the European in being of a less size, and more vividly coloured. The three-toed woodpecker is about ten inches in length; the ground-colour of the plumage of the upper parts is black, barred and spotted with white; the under parts are white, with transverse markings along the sides. The top of the head in the male is of a fine golden tint with an inclination to orange.

Among the less typical forms of the woodpeckers, but which have truly zygodactyle feet, we may notice the Picus Chilensis (Garm. 'Zool. de la Coquille,' pl. 32) and the Picus (Trachyphonus) Cafer.

1656.—The Chilian Woodpecker

(*P. Chilensis*). In this species the legs and feet are more slender than in the ordinary examples of this tribe, and the tail, instead of being graduated and wedge-shaped, with the stiff feathers so arranged as to support and strengthen each other (as is well seen in our pictorial specimen of the scaled woodpecker, Fig. 1653), consists of somewhat softer feathers, which, instead of being graduated, are nearly of equal length, so that the tail is but slightly rounded at its termination. In the ordinary woodpeckers the rigid tail-feathers are all bent inwards, especially at their points, in order to catch the bark and support the birds while clinging to the stems of trees. In this species the feathers are straight. We see in fact a departure from the scansorial model, as presented by the more typical forms of the Picidæ. The present species is found in the woods of the province of Concepcion in Chile. M. Lesson killed many individuals upon the peninsula of Talcaguano.

The Chilians call this bird Carpentero, a name generally applied by the Spaniards to the woodpeckers, both in Europe and America.

Lesson describes it as being of a sombre tint with little bars of brown and whitish, except on the lower part of the back and rump, where a single colour predominates, forming a large patch of pure white; bill black; a grey hood, pencilled with very bright grey, covers the head; cheeks rusty, and throat whitish; all the upper part of the body, wings, and even the great quills, rusty brown barred with small whitish bands; shafts of the quills golden yellow, and their internal part fulvous brown, with a white border or a single spot of the same colour towards the middle; breast, abdomen, and flanks whitish, dotted with brown; colour of each feather yellowish white, while the middle is occupied by a circle of brown deepest upon the breast. Tail-feathers stiff and wedge-shaped, brown above, with a slight fulvous tint brightest below; the two external and the two internal ones are pencilled with whitish sinuous bands upon their edges. Colour of the tarsi greenish, that of the claws approaching reddish. Total length more than eleven inches. (Lesson.)

1657.—The Caffre Woodpecker

(*Trachyphonus Cafer*, G. R. Gray). Le Promépic of Le Vaillant.

In this bird we are presented with a still further departure from the model: the tarsi are elevated; the tail soft and rounded, with the feathers broad at their apex: the beak arched; and the general contour remote from that so palpably characteristic of the habits of the woodpeckers, and which a glance is sufficient to appreciate.

Mr. G. R. Gray, we believe, places this species in his subfamily Bucconinæ (Barbets), and Cuvier discovers in its arched beak an approach to the Cuckoos. In some respects it appears to us to approach the Wryneck. The Caffre woodpecker seeks its food on the ground, in the crevices of the bark and under the moss of decayed trees and mouldering logs. The colouring of this species is as follows:—head, belly, and rump yellow; upper coverts of the tail orange; forehead black; two black scanty pointed aigrettes; a large black collar variegated with white, bordered above with a small narrow white edging varied a little with brown below; back of the neck and back brown, each feather terminated with white. Tail rounded, brown, striped with greyish white; bill black at the point.

This is the Promépic of Le Vaillant; Trachyphonus Vaillantii, Ranz; Micropogan sulphuratus, Latr.; and Polysticte quopopa, Smith. Native country, Caffraria.

1658.—The Wryneck

(*Yunx Torquilla*). Le Torcol, Buffon: Die Wendehals, Bechstein; Long-tongue, Emmet-hunter, Snake-bird, and Cuckoo's-mate, Provincial English.

The Wryneck is one of our summer visitors, and, though common in the southern and eastern counties of our island, is very scarce in the north and west. In Ireland, we believe, it is never seen. It arrives in April, a few days before the appearance of the cuckoo, and its loud cry of *peep, peep, peep*, monotonously repeated, is first heard when the elm-tree leaves are as large as a silver sixpence. Groves, orchards, and woods are the resorts of this elegant bird, and also the lines of tall beech-trees along hedgerows. Ants are its favourite food, and in quest of them it traverses the trunks of trees, though its tail is not used as an assistant in climbing, examining every crevice, and picking them up by means of its long vermiform tongue covered with a glutinous secretion. It also visits the ground for the same purpose, where it hops and walks with considerable facility, searching for the nests of these insects, and it is astonishing to see with what rapidity it devours them, launching its long tongue at them, and withdrawing it so rapidly that the eye can scarcely follow the motion. This tongue is evidently endowed with a high degree of sensibility, and perhaps of taste: we have frequently seen the wryneck in captivity launch it forth, when any substance has been presented as food, and touch the morsel with it, keeping it at the time in a state of quivering vibration: it reminded us of the tongue of the Dasypus Peba. In Fig. 1659 the head and tongue of the Wryneck are well delineated. White ('Nat. Hist. Selborne') says, "These birds appear on the grass-plots and walks; they walk a little, as well as hop, and thrust their bills into the turf, in quest, I conclude, of ants, which are their food: while they hold their bills on the grass, they draw out their prey with their tongues which are so long as to be coiled round their heads." Colonel Montagu informs us that having captured a female, which he confined for some days in a cage, he was enabled to watch its manners very minutely. "A quantity of mould, with emmets and their eggs, was given it; and it was curious to observe the tongue darted forth and retracted with such velocity and such unerring aim that it never returned without an ant or an egg adhering to it, not transfixed by the horny points, as some have imagined, but retained by a peculiar tenacious moisture provided for that purpose. While feeding, the body is motionless, the head only is turned to every side, and the motion of the tongue is so rapid that an ant's egg, which is of a light colour and more conspicuous than the tongue, has somewhat the appearance of moving to the mouth by attraction as a needle flies to a magnet. The bill is rarely used except to remove the mould in order to get more readily at these insects; where the earth is hollow, the tongue is thrust into all the cavities to rouse the ants, and for this purpose the horny appendage is extremely serviceable as a guide to the tongue. We have seen the green woodpecker take its food in a similar manner." The wryneck breeds in the holes of decayed trees, but does not excavate a chamber, like the woodpecker, the strength of the beak being inadequate for that purpose. The eggs, nine or ten in number, and of a pure transparent white, are laid upon the bare wood. When surprised upon her eggs, the wryneck defends herself with great spirit, erecting the feathers of the top of the head, and hissing like a snake. The young if molested also hiss, and turn their heads in various directions. The name wryneck is indeed given to this bird from its singular habit of twisting and wrything its neck with odd contortions when alarmed or irritated.

The wryneck leaves our island early in autumn, retiring southwards, and most probably passing the winter in Africa; specimens, indeed, have been received from that continent and from India. In Europe the wryneck is very generally spread during summer, being found even as far north as Sweden; but, according to Temminck, it is rare in Holland. Though the colours of this bird are not gaudy, they are scarcely to be exceeded for simple beauty and propriety of arrangement. The upper parts are brown and grey exquisitely dotted, and chequered with spots, dashes, zigzag bars, and lines of black and rufous, difficult to describe and difficult for the artist to copy. The throat is yellowish white, with transverse black bars; the breast and under parts are white, with arrow-head spots of black. Length seven inches.

The characters of the genus may be summed up as follows:—bill short, straight, conical and depressed, the ridge rounded, mandible sharp; tongue long, vermiform, armed at the tip with a horny but unbarbed point; feet zygodactyle, the two anterior toes united together at their base; tail-feathers ten, soft, and flexible; wings moderate. The species are limited in number.

Family TROCHILIDÆ (HUMMING-BIRDS).

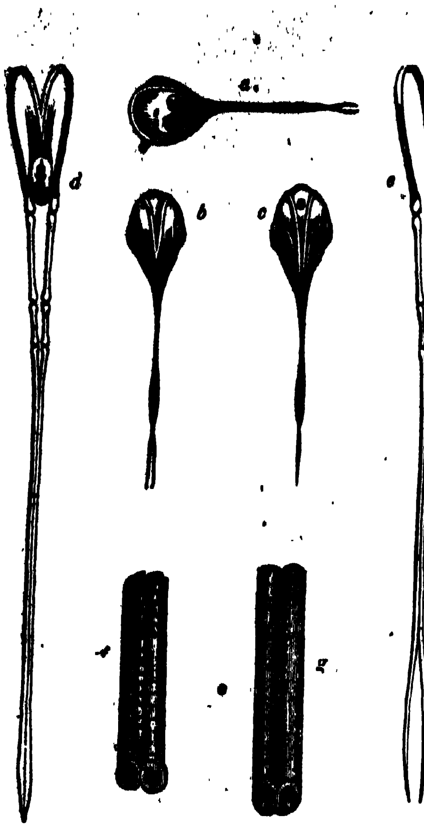
1660, 1661.—Examples of Humming-Birds

The humming-birds are among the least and most brilliant of the feathered race. Winged gems, they glance with dazzling effulgence as they dart along or hover over the fragrant flowers draining the nectary of its liquid sweets. No birds excel them in powers of flight; their long and narrow wings are admirably adapted for aërial progression. The quill-feathers are stiff, firm, and elastic, and furnished with rigid shafts, in some instances singularly developed. The tail is variable. The plumage is close and compact, and resembles an arrangement of fishes' scales, glittering, in the males, with metallic lustre. The tarsi are very small and short: and the toes, three before and one behind, are very delicate. The ground is never their resting-place; they perch on slender twigs, but are mostly seen on the wing. If we look at the tiny skeleton of one of these birds (Fig. 1662), we shall be struck by the great depth and extent of the keel of the breast-bone, the length of the scapulæ, and the comparative insignificance of the legs. The whole muscular force is, in fact, concentrated upon the organs of flight; the pectoral muscles, in comparison with the size of the bird, exceed in volume perhaps those of any other of the feathered race; and all the other muscles for working the wings are in just accordance. Looking at the skeleton alone, the comparative anatomist would say the greatest portion of the life of these birds, all their active existence, is passed on the wing. The primary quill-feather is always the longest. The beak is long and slender, but very variable in its form, being straight, curved, and in some species even turned up. The tongue is long, bifid, or split into two filaments, tubular, and capable of being darted out to a considerable distance. As in the woodpeckers, it is the principal instrument by means of which they obtain their food, viz., insects of various kinds and the nectar of flowers; and it is protruded by the same arrangement of the cartilaginous continuation of the os hyoides winding round the skull to the forehead, which we have explained in those birds. With respect to the tongue itself, Lesson describes it as composed of two musculo-fibrous cylinders, soldered to each other so as to resemble in some degree a double-barrelled gun: but these tubes towards the tip become separated and enlarged, each presenting a little blade, which is concave within and convex externally. "In order that this tubular tongue may be projected upon the aliments which its terminations are appointed to seize and retain, the os hyoides which supports it is formed of two bony plates or straps, which separate, pass below the cranium, reascend over the bones of the occiput, and proceed to form a point of resistance or fulcrum by their reunion on the forehead. The result of this disposition, when brought into play by the muscles of the tongue, is a great power over the muscular tubes which compose the organ of taste. The two small blades of elongated spoon-like termination seize the insects or lick up the honied exudations, which are on the instant carried to the aperture of the œsophagus by the elasticity and contractility of the two tubes, and forthwith swallowed. The long and slender bill comes in admirably in aid to insert the tongue in the nectary of flowers." Sir W. Jardine ('Nat. Libr. Ornithol.,' vol. i.) confirms this account given by Lesson, as does also Brisson, as far as he was enabled to discover by an examination of the parts moistened with water, after having been dried; but he adds, that it appeared to him, on investigating the structure of the tongue of the Trochilus moschatus thus relaxed, that its tip presented a fimbriated opening, having the exterior margin of each fork set with recurved, sharp-pointed, pliable spines, as if to assist its viscidity in securing any substance seized by them. Fig. 1663 represents the bill and tongue of the Humming-bird, after Lesson: *a*, the head profile, the tongue protruded from the bill, and showing its bifurcation; the two branches of the os hyoides seen surrounding the cranium; *b*, the same seen from above, the two branches of the os hyoides uniting at a pointed angle in front; *c*, the same seen from below; *d*, the tongue much magnified, with some of the soft parts dissected away, but adhering to the os hyoides and its branches, as well as to the larynx seen from above; *e*, the same seen from below, with the os hyoides only, and the two lamallæ of its point separated; *f*, portion of the tongue, very much magnified, seen from above, so as to convey the idea of the manner in which the cylinders that form it are united; *g*, the lower side of the same. The senses of sight and hearing are highly acute in the humming birds; and so, from the structure of the tongue and its office, we may conclude that of taste to be.

These gorgeous birds are all natives of America, "and, according to our best information, that great archipelago of islands between Florida and the mouth of the Orinoco, together with the mainland of the southern continent until it passes the tropic of Capricorn, literally swarms with them; in the wild and uncultivated parts they inhabit those forests of magnificent timber overhung with *lianas* and the superb tribe of Bignonaceæ, the huge trunks clothed with a rich drapery of parasites whose blossoms vie in tints, if not in brilliancy, with their winged riflers; in the cultivated parts they abound in the gardens, and seem to delight in society, becoming very familiar; feeling confidence in their own powers, they will even hover about one side of a shrub while flowers or fruits are plucked from the opposite. As we recede from the tropics on either side, the numbers decrease, though some species are found in Mexico, and others in Peru, which do not appear to exist elsewhere. Thus Mr. Bullock discovered several species at a high elevation, and consequently low temperature, on the lofty tablelands of Mexico, and in the woods in the vicinity of the snowy mountains of Orizaba; while Captain King, in his survey of the southern coasts, met with numerous members of this diminutive family flying about in a snow-storm near the Straits of Magellan, and discovered two species in the remote island of Juan Fernandez. Two species only spread far into the northern continent of America: the one, the Ruff-necked Humming-bird, which was discovered by Captain Cook in Nootka Sound, and has been traced by Kotzebue to 61° along the western shores; the other, the Northern or Ruby-throated Humming-bird, so beautifully described by Wilson. This species has been obtained from the plains of the Saskatchewan, and was found breeding, by Mr. Drummond, near the sources of the Elk river. It is known to reach as far north as the fifty-seventh parallel."

The velocity with which the humming-birds glance through the air is extraordinary, and so rapid is the vibration of their wings, that the action eludes the sight; when hovering before a flower, they seem suspended as if by some magic power, rather than by the vigorous movement of their rigid pinions, which, however, produce a constant murmur or buzzing sound, whence the English title by which we designate these birds, and the Creole epithets in Cayenne and the Antilles, viz., Murmures, Bourdons, and Frou-frous.

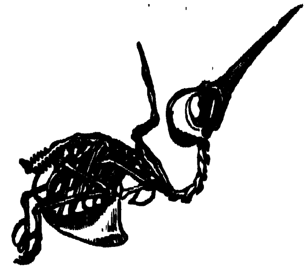
It has been frequently and justly observed, that in their mode of flight the humming-birds closely resemble the sphinx-moths, or the dragon-flies,



1662.—Bill and Tongue of Humming-bird, dissected.

1658.—Wrynecks.

1661.—Humming-bird.



1663.—Skeleton of Humming-bird

1660.—Group of Humming-birds.

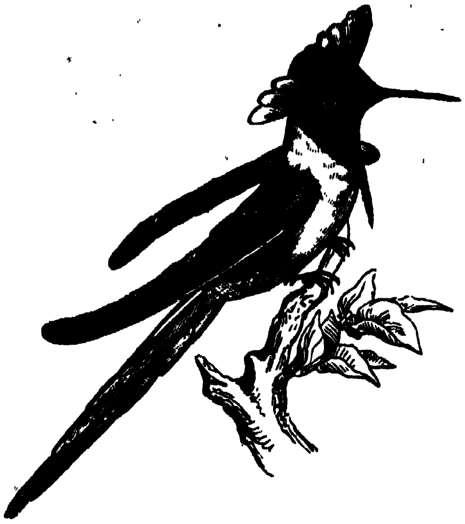
1656.—Three-toed Woodpeckers.

1659.—Head and Tongue of Wryneck.

1669.—Racy-throated Humming-bird.

1664.—Nest of Humming-bird.

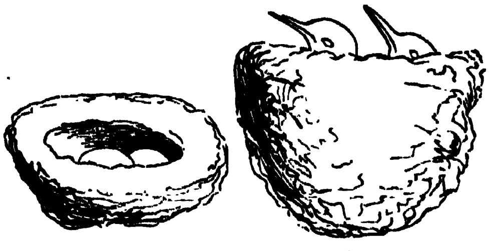
1670.—Ruby-throated Humming-bird and Nest.



1671.—Double-crested Humming-bird.

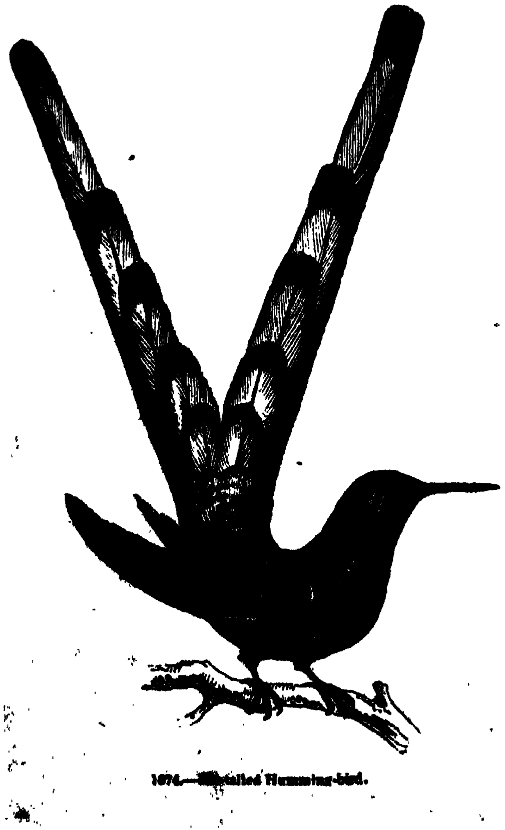
1665.—Nest of Humming-bird.

1666.—Nest of Amethyst Humming-bird.

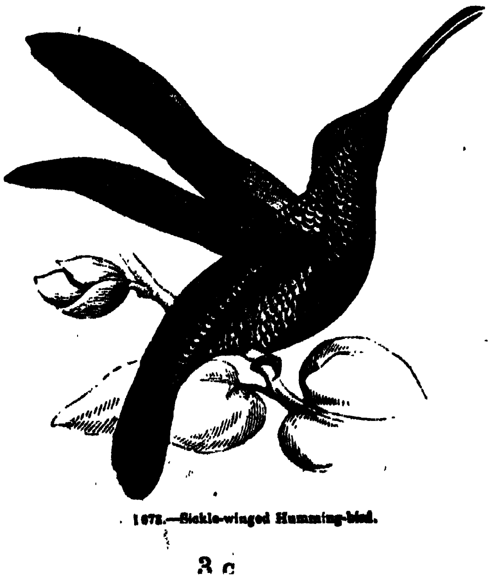


1667. 1668

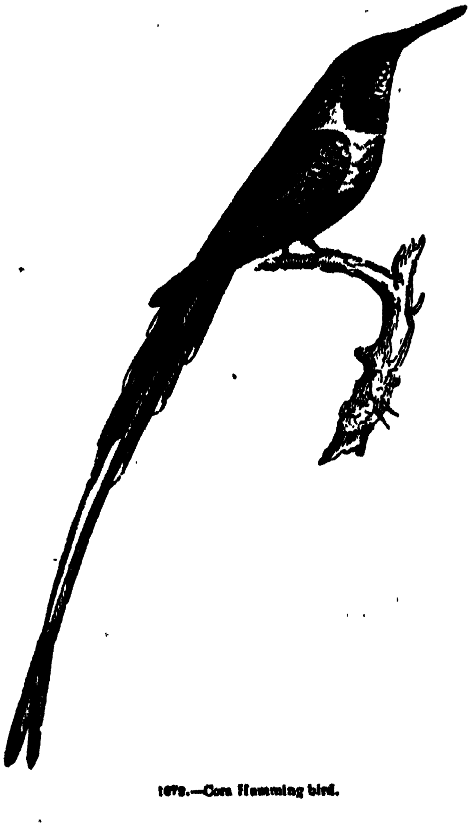
Nest of Humming-bird.



1674.—Bar-tailed Humming-bird.



1673.—Sickle-winged Humming-bird.



1672.—Cora Humming bird.

Mr. Darwin, in his admirable 'Journal,' states, that while at [illegible], he started early one morning and walked to the top of the Gavia, or Topsail Mountain. "The air was delightfully cool and fragrant, and the drops of dew still glittered on the leaves of the large liliaceous plants which shaded the streamlets of clear water. Sitting down on a rock of granite, it was delightful to watch the various insects and birds as they flew past. The humming-birds seem particularly fond of such shady retired spots; whenever I saw these little creatures buzzing round a flower with their wings vibrating so rapidly as to be scarcely visible, I was reminded of the sphinx-moths; their movements and habits are indeed in many respects very similar." (p. 36.) Bullock and Wilson both notice the surprising rapidity of the vibrations of their wings; the former, speaking of specimens caged, says, that in a space barely sufficient for them to move their wings, they will keep their bodies in the air apparently motionless for hours together. There are, however, exceptions to this rule; Mr. Darwin, describing the Trochilus gigas, which, as he observed, had arrived in the neighbourhood of Valparaiso in numbers a little before the vernal equinox, adds:—"It comes from the parched deserts of the north, probably for the purpose of breeding in Chile. When on the wing the appearance of this bird is singular. Like the others of the genus, it moves from place to place with a rapidity which may be compared to a syrphus amongst dipterous insects and a sphinx amongst the moths; but whilst hovering over a flower, it flaps its wings with a slow and very powerful movement, totally different from that vibratory one, common to most of the species, which produces the humming noise. I never saw any other bird the force of whose wings appeared so powerful in proportion to the weight of its body. When hovering by a flower, its tail is constantly expanded and shut like a fan, the body being kept in a nearly vertical position. This action appears to steady and support the bird between the slow movements of its wings. Although flying from flower to flower in search of food, its stomach generally contained abundant remains of insects, which, I suspect, are much more the object of its search than honey is. The note of this species, like that of nearly the whole family, is extremely shrill." These brilliant creatures are an intrepid daring race, and extremely pugnacious, and cannot endure the approach of one even of their own species, still less of any other bird near their breeding-places. Of one minute but beautiful species, the Mexican Star, Mr. Bullock says:—"When attending their young they attack any bird indiscriminately that approaches the nest. Their motions, while under the influence of anger or fear, are very violent, and their flight rapid as an arrow; the eye cannot follow them, but the shrill piercing shriek which they utter on the wing may be heard when the bird is invisible. They attack the eyes of the larger birds, and their sharp needle-like bill is a truly formidable weapon in this kind of warfare. Nothing can exceed their fierceness when one of their own species invades their territory during the breeding-season; under the influence of jealousy they become perfect furies, their throats swell, their crests, tails, and wings expand, they fight in the air, uttering a shrill noise, till one falls exhausted to the ground."

With respect to the voice of the humming-birds, we have reason to believe that it consists only of a shrill cry; such is Lesson's assertion, who remarks, that it is uttered chiefly on the wing, or under the excitement of anger, &c., and that they are most frequently mute; others, however, assert that they utter a song, which statement, if at all correct, is only applicable to a few species. Bullock speaks of a minute species in Jamaica, to which he listened, in the Botanical Garden of that island, as it poured forth its "slight querulous note."

Père Labat, in 1547, and Rochfort, in 1658, describe spiders in the "Bermudez" and Antilles which make webs strong enough to entangle small birds. Madame Merian, in her work, figures a gigantic round spider, which makes no net, of the genus Mygale, in the act of devouring a humming-bird, thus deceiving later naturalists, and even Linnæus, who termed the species Aranea avicularia. Mr. Macleay informs us that there are in the West-Indies huge spiders belonging to the genus Nephila (as N. clavipes, or Epeira clavipes of Latreille), common, like our own Epeira diadema, in gardens, which make a mathematical net strong enough indeed to embarrass small birds, but which, he states, do not attempt to catch birds, and never molest them: and in a note he adds, when M. Langsdorff asked the people of Brazil if the Caranquexeira, for such is the spider's name in that country, fed upon humming-birds, they answered him, with bursts of laughter, that it only gratified its maw with large flies, ants, bees, wasps, beetles, &c., an answer which the traveller found the truth of by personal experience. ('Trans. Zool. Soc.,' vol. i.)

It would appear, from Mr. Bullock's statement, that humming-birds often avail themselves of the insects caught in spiders' webs, not, however, without the spiders endeavouring not to devour, but drive them away. "The house," he writes, "I resided in at Xalappa for several weeks on my return to Vera Cruz, was only one story high, inclosing, like most of the Spanish houses, a small garden in the centre, the roof projecting six or seven feet from the walls, covering a walk all round, and leaving a small space only between the tiles and trees which grew in the centre. From the edge of these tiles to the branches of the trees in the garden the spiders had spread their innumerable webs, so closely and compactly that they resembled a net: I have frequently watched with much amusement the cautious peregrination of the humming-bird, who advancing beneath the web, entered the various labyrinths and cells in search of entangled flies; but as the larger spiders did not tamely surrender their booty, the invader was often compelled to retreat. Being within a few feet, I could observe all their evolutions with great precision: the active little bird generally passed once or twice round the court, as if to reconnoitre his ground, and commenced his attack by going carefully under the nets of the wily insect, and seizing by surprise the smallest entangled flies or those that were most feeble. In ascending the angular traps of the spider, great care and skill were required; sometimes he had scarcely room for his little wings to perform their office, and the least deviation would have entangled him in the complex machinery of the web, and involved him in ruin. It was only the works of the smaller spiders that he durst attack, as the largest rose in defence of their citadels, when the besieger would shoot off like a sunbeam, and could only be traced by the luminous glow of his refulgent colours. The bird generally spent about ten minutes in this predatory excursion, and then alighted on a branch of an avocata to rest and refresh himself, placing his crimson star-like breast to the sun, which then presented all the glowing fire of the ruby, and surpassed in lustre the diadem of monarchs." The species referred to is the Mexican Star. In sleeping, according to the same authority, these beautiful birds frequently suspend themselves by the feet, with the head downwards.

The nests of the humming-birds are most beautiful compact structures, with exquisite finish and nicety of arrangement. We have seen one composed of the finest silky down, or cotton, of a delicate straw-yellow, soft, light, and compact, attached to the end of a twig, and concealed by leaves. In some cases the outside is formed of fine moss, lichens, &c., investing a compact bed of the down of plants, cotton, and even spiders' webs.

Figs. 1664 and 1665 are the nests of Humming-birds (from Lesson). These are covered on the outside with bits of lichen, leaves, moss, &c. One contains two white eggs (the usual number and colour of the eggs of these birds), of an elongated form. Fig. 1666 represents the Nest of the Brazilian Amethyst Humming-bird (Ornismya Amethistoïdes, Less.): *a*, the egg.

In the 'Zoological Journal,' vol. v., is an interesting account of the nidification of a species of humming-bird, by the late Captain Lyon, R.N.: the nest, it appears, was not completed till after the young were hatched. (Figs. 1667 and 1668.) Writing from Gongo Soco, Brazil, March 17th, 1829, he says:—"I am too closely confined here, and too constantly occupied, to attend much to natural history or anything except the mines, but it may interest you to have an account of some young humming-birds whose hatching and education I studiously attended, as the nest was made in a little orange-bush by the side of a frequented walk in my garden. It was composed of the silky down of a plant, and covered with small flat pieces of yellow lichen. The first egg was laid January 26th, the second on the 28th, and two little creatures like bees made their appearance on the morning of February 14th. As the young increased in size, the mother built her nest higher, so that, from having at first the form of Fig. 1667, it became ultimately like Fig. 1668.

"The old bird sat very close during a continuance of the heavy rain for several days and nights. The young remained blind until February 28th, and flew on the morning of March 7th, without previous practice, as strong and swiftly as the mother, taking their first dart from the nest to a tree about twenty yards distant."

It must not be supposed that this plan of adding to the structure after the hatching of the eggs is the ordinary plan. In this instance perhaps the bird had been driven from a nest previously made, and had not time to finish the new one before depositing the eggs, and was thus subsequently compelled to add to it.

In some districts, undoubtedly, the humming-birds are migratory, such as the northern or ruby-throated species. Mr. Darwin ('Journal'), after adverting to two species common in Chile, and a third found on the Cordilleras at an elevation of about ten thousand feet, proceeds to observe: "In Central Chile these birds are migratory; they make their appearance there in autumn, and in the latter end of the month corresponding to our October they are very common. In the spring they begin to disappear, and on the 12th of what would correspond to our March I saw only one individual. As this species migrates to the southward, it is replaced by the arrival of a larger kind (the Trochilus gigas). I do not believe the small kinds breed in Chile, for during the summer their nests were common to the south of that country. The migration of the humming-birds, both on the east and west coast of North America, corresponds to what takes place in this southern continent. In both cases they move towards the tropic during the colder parts of the year, and retreat before the returning heat. Some, however, remain during the whole year in Tierra del Fuego; and in Northern California (which in the northern hemisphere has the same relative position which Tierra del Fuego has in the southern) some, according to Captain Beechey, likewise remain." (p. 331.)

1669, 1670.—The Ruby-throated Humming-Bird

(*Trochilus Colubris*). Audubon describes and figures four species of humming-birds as North American, viz. the T. Colubris, the T. Anna, the Lamprornis Mango, and the Calliphlox rufa (T. rufus, Gmel.): but it must be observed that upwards of two hundred species are known; in the cabinet of Mr. G. Loddiges, of Hackney, there are one hundred and ninety-six species, if not more—a gorgeous display of dazzling brilliants.

The Ruby-throated Humming-bird usually arrives in Pennsylvania about the 25th of April, but in Louisiana it has been observed as early as the 10th of March. It has all the manners of its race; it hovers around the blossoms of trees and shrubs, giving preference to tubular flowers, not so much for the sake perhaps of the honey, as of the insects which crowd the nectary to feed upon its sweets. That insects, and those too of the coleopterous order, constitute a great portion of the food of this species, has been proved by dissection. "I have seen," says Wilson, "the humming-bird, for half an hour at a time, darting at those little groups of insects that dance in the air on a fine summer evening, retiring to an adjoining twig to rest, and renewing the attack with a dexterity that sets all our other flycatchers at defiance. I have opened from time to time great numbers of these birds, have examined the contents of the stomach with suitable glasses, and in three cases out of four have found these to consist of broken fragments of insects. In many subjects, entire insects of the coleopterous order, but very small, were found unbroken."

The general colour of the upper parts of this species, including the two central tail-feathers, is green with gold reflexions. The whole of the throat and fore part of the neck is of a deep fiery ruby tint in some lights; in others, of a burnished crimson or orange glow; in others, velvet-black: under parts greyish white mixed with green. Quills and tail purplish brown. The female is destitute of the ruby throat, which is white, as are the under parts generally. Length three inches and a half. Fig. 1670 represents the Female and Nest.

1671.—The Double-crested Humming-Bird

(*Ornismya Chrysolopha*, Lesson). Trochilus bilophus, Temm. This is a most gorgeous species. Two flattened fan-shaped crests, each composed of six small feathers, part from the forehead on a level with the eyes. The brilliancy of these crests surpasses description, glistening as they do with the hues of polished gold and red copper, changing into the gemmy tints of the ruby and emerald, now fire-coloured, anon the purest green, and presently the brightest yellow. The scaly feathers of the forehead between the two crests sparkle with metallic uniform green, changing to steel or sapphire blue. A *camail* of dark changeable violet extends from the throat behind the eyes, and descends along the sides of the neck to terminate in a point of long feathers before the breast. This uncertain violet, graduating into a non-metallic blue, with its velvety very dark tint, is sharply defined on the milk-white of the breast, which extends to the lower part of the neck, so as to form a rather large white collar. The lower part of the belly is white; but the middle of the abdomen and the flanks are, like the back, golden green, with which is mingled a little of the greyish colour of the base of the feathers. Back and sides of the head behind, back, and feathers of the rump, metallic golden green. Quills brown; tail long, narrow, and much graduated. Length four inches and a half, including the long tail and bill.

1672.—The Cora Humming-Bird

(*Ornismya Cora, Less.*) This species is a native of Peru, and especially the plains of Lima. The bill is slender, the tarsi feeble and short, the tail graduated with the two middle feathers greatly prolonged; the wings are purpled brown: the general plumage above bright golden green; the throat and front of the neck sparkle with the violet tint of the amethyst, and a white gorget marks the limits of the scaly feathers; flanks and under parts golden green; lateral tail-feathers brown with white borders; two central white with black tips. Total length nearly six inches, of which the tail measures three inches and a half.

1673.—The Sickle-winged Humming-Bird

(*Campylopterus falcatus*). This species is a native of the Spanish Main. Its colours are dazzling: the prevailing tint is refulgent green; the throat and breast shining blue; the tail rufous cinnamon. The outer quills of the wings are singularly curved, and have strong dilated shafts, giving additional powers to the wing, which is of a sabre-shape and admirably adapted for rapid flight.

1674.—The Bar-tailed Humming-Bird

(*Ornismya Sappho*, Lesson). Trochilus sparganurus, Shaw; T. chrysochloris, Vieill. This brilliant species, a native of Eastern Peru, is at once to be distinguished by the shape of its tail, which is forked to the base, and thus consists of two diverging portions, each containing five feathers, graduating in length one beyond another. Their colour is of the richest flame or bright orange red, with a dazzling metallic lustre, and a broad mark of black at the tip. The upper surface is fine golden green; the rump dull red; the under surface bright emerald green.

1675.—Gould's Humming-Bird

(*Ornismya Gouldii*, Lesson). The native district of this splendid species is unknown. The forehead, throat, and upper part of the breast are of the most brilliant green, the feathers being of a scaly form. From the crown springs a pyramidal crest of bright chestnut colour, and capable of being raised up or depressed at pleasure. The back and upper parts are golden green, crossed upon the rump with a whitish band. The wings and tail are brownish purple, the latter having the centre feathers tinged with green. The sides of the neck are adorned with tufts, producing a chaste but brilliant effect; these tufts consist of narrow feathers, arranged so as to form a fan, which are of snowy whiteness, each having at its tip a spot of bright emerald-green surrounded by a darker border.

1676.—The Recurved-bill Humming Bird

(*Trochilus recurvirostris*) In this species, which appears to be a native of Peru, the bill is singularly turned up at the point, in order, it has been suggested, to enable the bird to reach the nectaries of the Bigoniæ, whose corollæ are long and generally bent in the tube. The general colour is golden green; the throat shining emerald-green; middle of the breast and of the under surface black; lateral tail-feathers beneath topaz.

Many instances are on record of humming-birds being kept in confinement in their native country. Mr. Bullock, when in Mexico, had nearly seventy in cages, and declares that could he have devoted his attention to them, he had no doubt of the possibility of bringing them alive to Europe: nor do we question it for a moment. In proof, indeed, of the possibility, we may observe, that a gentleman, a few days before he sailed from Jamaica, having found a female Mango humming-bird sitting on her nest and eggs, cut off the twig and brought the whole on board. The bird became so tame as to suffer herself to be fed on honey and water during the passage, and hatched two young ones. The mother did not long survive, but the young were brought to England, and continued some time in the possession of Lady Hammond, from whose lips they took honey; and though one did not live long, the other survived for at least two months from the time of their arrival.

Family CINNYRIDÆ (SUN-BIRDS).

Fig. 1677 represents the forms observable in the bills of the birds of the present family, and also of the Honeysuckers (Nectariniadæ, Vigors), which Mr. Swainson considers as forming one of the groups of the Cinnyridæ. *a*, bill of Melithreptes; *b*, bill of Cinnyris; *c*, bill of Anthreptes; *d*, Nectarinia; *e*, Dicæum.

The Sun-birds are exclusively natives of the warm climates of the Old World, viz. India and Africa, and approach the humming-birds in manners, as they almost rival them in brilliancy of plumage. Unlike the creepers, which travel mouse-like along the branches, or the honeysuckers (Nectariniadæ), which flit from twig to twig and flower to flower, resting while they explore the nectary with their beak, these glossy birds usually hover on quivering wings, poised in the air, while they bury their long slender bills in the corolla. Their plumage glitters with metallic effulgence, but the colours are not changeable in varied lights like the burning hues of the humming-birds; the feathers are not in fact scale-like, or of that texture producing innumerable facets, each facet reflecting the rays of light at ever-changing angles they are simply burnished.*

Insects of various kinds constitute the diet of the sun-birds, together with honey: their bill is more or less curved; the tongue is long, retractile, pencilled, or simply forked at the tip.

The sun-birds are animated, rapid, and graceful in their movements; their disposition is lively, and their song agreeable. For an account of several species recently introduced to science, see Colonel Sykes's 'Catalogue of the Birds of Dukhun' ('Zool. Proceeds.' 1832, pp 98, 99). It will be observed that insects of various kinds were mostly found in the stomachs of those examined, and that it is stated "they hover before flowers and suck honey on the wing."

1678.—The Collared Sun-Bird

(*Cinnyris chalybeea*). Lesser Collared Creeper of Swainson. In the restricted genus Cinnyris the bill is long and slender, and the margins are minutely denticulated; the tongue retractile and simply forked, the third quill feather the longest.

The Collared Sun-bird (Soui manga à Collier of Vieillot) is a native of Africa. Its general colour is golden green, with brownish wings and tail, and a narrow red band across the breast, bordered above by another of steel-blue; upper tail-coverts blue.

1679 —The Javanese Sun-Bird

(*Anthreptes Javanica*). Nectarinia Javanica, Horsfield The genus Anthreptes is characterized by Mr. Swainson as having the bill moderate, rather strong, slightly curved, wings, feet, and tail as in Cinnyris.

The Javanese Sun-Bird is of a glossy metallic purple above, olive-yellow beneath, the scapulars, the rump, and a broad stripe curving from the base of the beak to the breast glossy violet, throat chestnut, tail black. Native country, Java

Family NECTARINIADÆ (HONEYSUCKERS).

The Nectariniadæ of Vigors are peculiar to South America, where, amidst the most luxuriant foliage and the wildest profusion of flowers, they flit and hop from twig to twig, from blossom to blossom, in quest of small insects and honey, probing the nectaries with their bill. The bill and feet are stronger than in the sun-birds, and the powers of wing more limited. Their plumage is brilliant.

1680 —The Blue-Headed Honeysucker

(*Nectarinia cyanocephala*). Cayenne Warbler, Blue-headed Warbler, and Blue-headed Creeper, Latham, Le Petit Verd, Brisson. The male of this species is of a changeable blue; the throat, back, tail, and wings black, the quills edged with blue. The female is green, with the head, cheeks, and scapulars bluish, and the throat grey

Mr. Swainson, who observed this bird in its native country, after stating that its habits are precisely those of the other Nectariniadæ, says, "It is one of the commonest birds of Brazil, and appears spread over the whole extent of that country. It frequents the same trees as the humming-birds, hopping from flower to flower, and extracting the nectar from each; but this is not done on the wing, because its formation is obviously different from the humming-birds, which, on the contrary, poise themselves in the air during feeding." The young males have the colours of the females. The upper figure is that of a female, the lower, that of a male.

Family MELIPHAGIDÆ (HONEYEATERS)

In this family we also find the suctorial structure of the tongue, but the bill and legs are stronger than those even of the Nectariniadæ. The hind-toe is particularly large, and furnished with a powerful claw, and the tarsi are robust. The species are natives of Australia and various islands adjacent. Though the tongue is suctorial and tipped with a pencil of delicate filaments, it is not nearly so extensible as in the humming-birds, nor, according to Mr. Swainson, do the branches of the os hyoides wind round the skull. Insects and the honey of flowers constitute the food of these birds, to which some species add fruits or berries.

Lewin, who drew and described these birds in their native region, has figured the tongue of the warty-faced honeysucker (Meliphaga Phrygia) ('Birds of New Holland,' pl. 4), and describes the bird as sometimes to be seen "in great numbers, constantly flying from tree to tree (particularly the blue gum), feeding among the blossoms by extracting the honey with their long tongues from every flower as they passed." The same observer, speaking of the blue-faced honeysucker, describes it as being "fond of picking transverse holes in the bark, between which and the wood it inserts its long tongue in search of small insects, which it draws out with great dexterity.

According to Lewin, the yellow-eared honeysucker in the winter season feeds on the sweet berries of the white cedar.

1681.—The New Holland Honeysucker

(*Meliphaga Novæ Hollandiæ*). As its name implies, this bird is a native of New Holland, and, as Mr. Caley states, is "most frequently met with in the trees growing in scrubs, where the different species of Banksia are found, the flowers of which, I have reason to think, afford it a sustenance during winter. In the summer I have shot it when sucking the flowers of Leptospermum flavescens. In the scrubs about Paramatta it is very common."

1682.—The Poe' Bird

(*Prosthemadera Novæ Seelandiæ*), This splendid bird, which equals a pigeon in size, is a native of the woods of New Zealand, which resound with its tuneful notes: it is stated not only to be a delightful songster, but to be capable of imitating the voices of other birds. It is remarkable for two plumes of snowy white, hanging one on each side of the throat. In the Wattled Honeyeater of Van Diemen's Land (Anthochæra carunculata) two fleshy wattles hang in the same manner; and in the Meliphaga pencillata, Gould, a native of New South Wales, a small white tuft passes behind the ear-coverts. In the genus Tropidorhynchus, one of this family, we find the head more or less denuded of feathers, and in one species, the Knob-fronted Honey-eater (T. corniculatus), there is a fleshy excrescence rising up at the base of the upper mandible.

The plumage of the Poe-bird may be thus described —Head, neck, chest, and greater wing-coverts, and outer edges of the secondaries, dark metallic green, with bronzed reflexions: the feathers of the back of the neck are long and pointed, and have a narrow white line down the centre of each. From the angle of each lower jaw depends a curled tuft of soft white feathers, spreading at their apex, narrow at their base; back glossy bronzed brown, a patch of pure white on the shoulders, rump glossy steel-blue, tail brown, glossed above with steel blue; quills brown, more or less glossed on their edges with blue, under parts blackish brown, with a wash of rufous. Total length upwards of twelve inches.

Family PROMEROPIDÆ (PROMEROPES).

The Promeropidæ (from which we have excluded the hoopoes) are birds of extremely brilliant plumage, with long slender bills capable of penetrating into the nectary of flowers. Cuvier says the tongue is extensible, and bifid at the tip, enabling them to live on the honey of flowers, like the sun-birds and humming-birds; but no doubt insects, and perhaps soft fruits, constitute the greater portion of their diet. The tail is extremely long; the legs small; the general contour slender.

1683.—The Red-billed Promerops

(*Promerops erythrorynchus*). Le Promerops moqueur of the French. This brilliant bird is a native of the interior of Southern Africa, where it lives in troops, which make when disturbed a loud chattering The whole of the plumage is varied with metallic blue and green; the bill is coral-red. The tail is greatly prolonged, and the feathers are graduated.

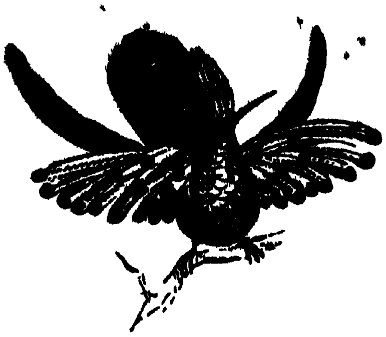
1684.—The Superb Epimachus

(*Epimachus magnus*). In the genus Epimachus the bill closely resembles that of Promerops, but the nostrils are partially hidden by velvety feathers as in the Birds of Paradise; the plumage of the Epimachi glows with the same effulgence as in the latter, and they are natives of the same regions. In the males the feathers of the sides are more or less prolonged and enlarged.

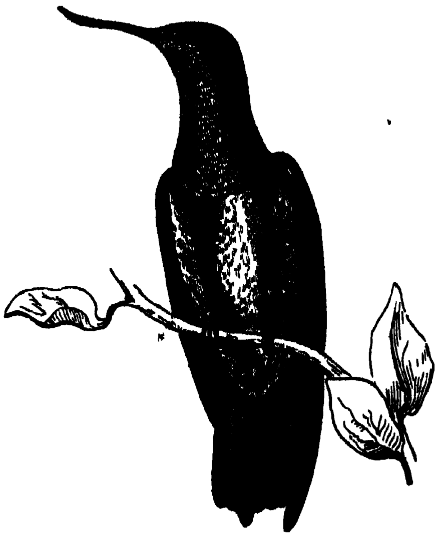
"There does not perhaps exist," says Sonnerat, "a more extraordinary bird than the grand Promerops of New Guinea. It is four feet in length from the extremity of the bill to that the tail. Its body is delicate, slender, and, although it is of an elongated form,

---

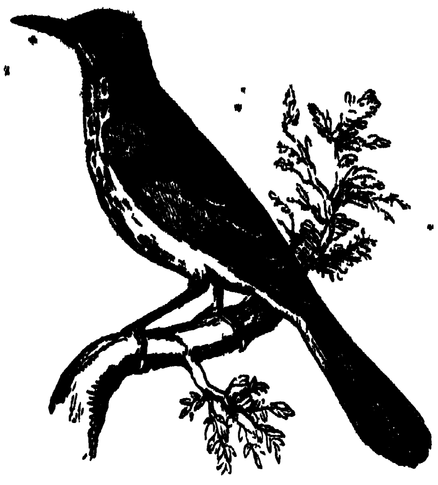
* All the scaly feathers, in fact, observes Lesson, which simulate velvet, the emerald or the ruby, and which one sees on the head and the throat of the Epimachi, the Paradise-birds, and the Humming birds, resemble each other in the uniformity of their structure, are all composed of cylindrical barbles bordered with other analogous regular barbles, which in their turn support other small ones, and all of them are hollowed in the centre with a deep furrow, so that when the light, as Audebert first remarked glides in a vertical direction over the scaly feathers, the result is that all the luminous rays are absorbed in traversing them, and the perception of black is produced But it is no longer the same when the light is reflected from these feathers (each of which performs the office of a reflector) then it is that the aspect of the emerald, the ruby, &c, varying with the utmost diversity under the incidences of the rays which strike them, is given out by the molecular arrangement of the barbles As an example of the diversity of tints which spring from such scaly feathers, M. Lesson cites the emerald "cravat" of many species, which takes all the hues of green, and then the brightest and most uniformly golden tints, down to intense velvet black; or that of ruby, which darts forth pencils of light, or passes from reddish orange to a crimsoned red black.



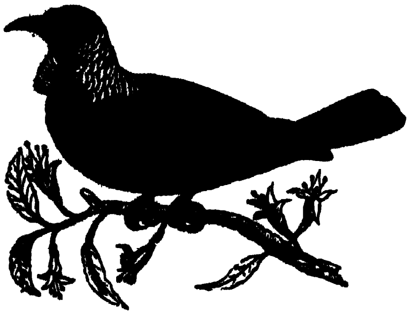
1675.—Gould's Humming-bird.



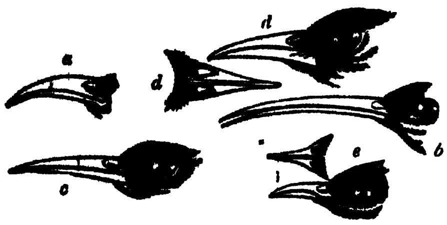
1676.—Recurved-bill Humming-bird



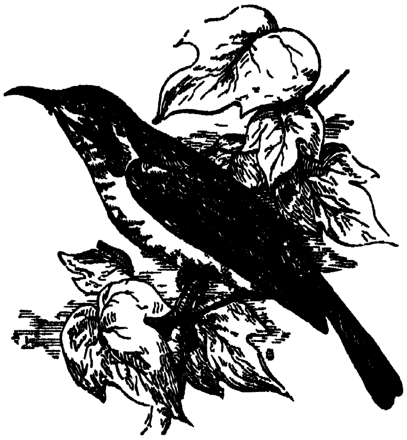
1681.—New Holland Honeysucker.



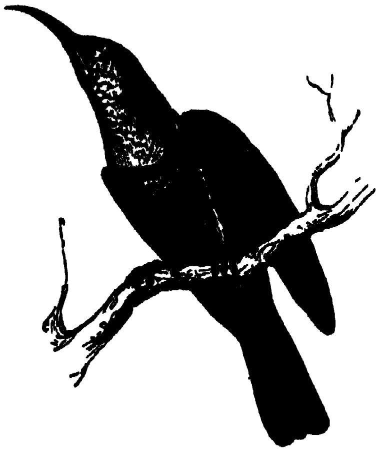
1682.—Poe Bird.



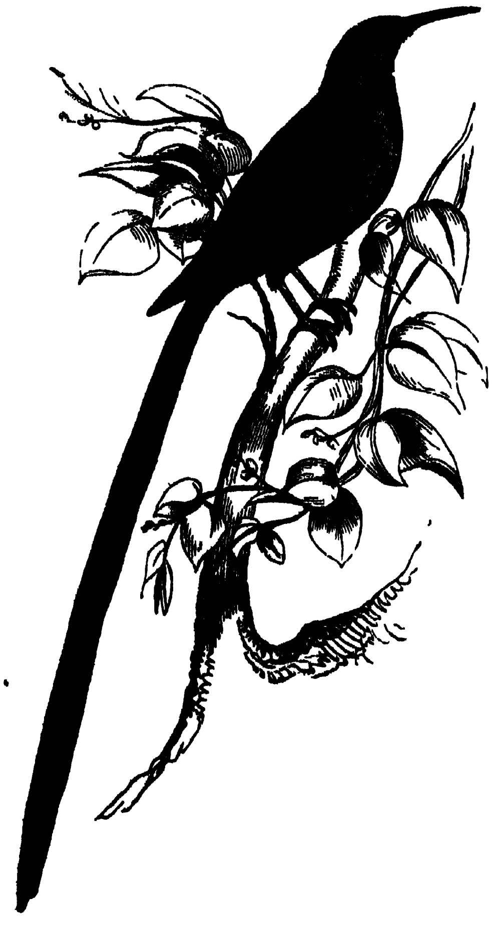
1677.—Bills of Sun-birds.



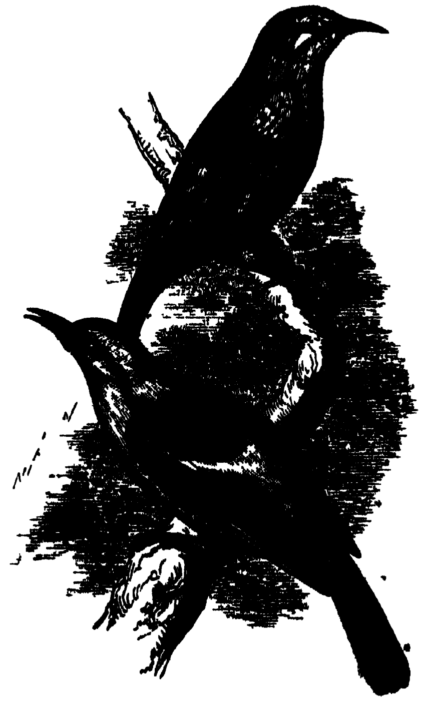
1679.—Javanese Sun-bird.



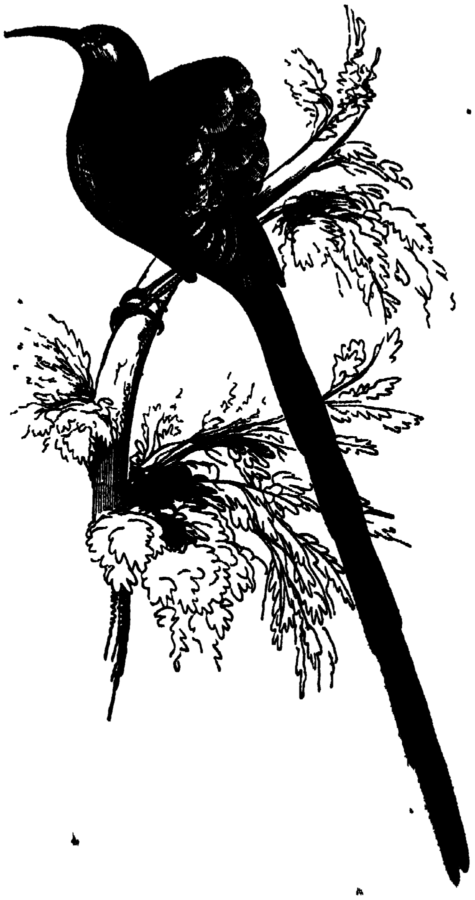
1678.—Collared Sun-bird



1683.—Red-billed Promerops.



1680.—Blue-headed Honeysuckers.

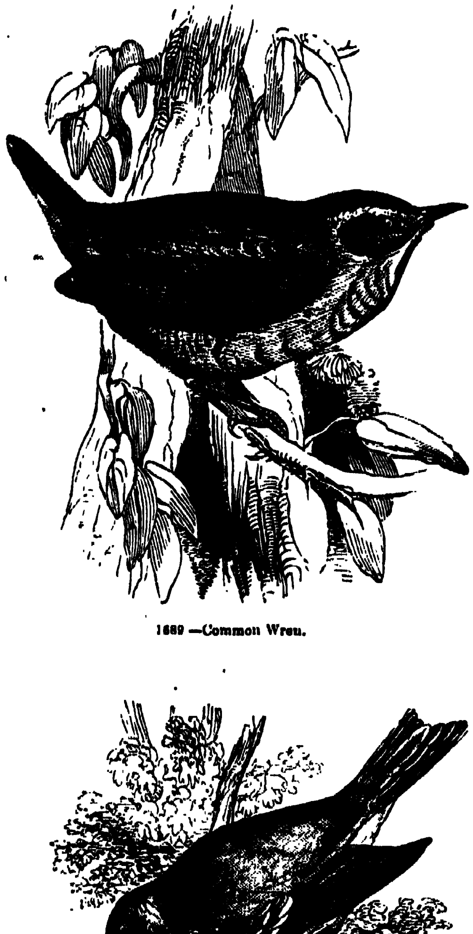


1684.—Superb Epimachus.

1686.—Nest of Wood-Swallow.

1692.—Wood-Wren.

1687.—Swarm of Wood-Swallows.


1689.—Common Wren.

1690.—Nest of Wren.

1691.—Gold Crests.

1688.—Cinereous Wood-Swallows.

1685.—Common Wood-Swallow.

appears short and excessively small in comparison with the tail. To add to the singularity of this bird nature has placed above and below its wings feathers of an extraordinary form, and such as one does not see in other birds: she seems, moreover, to have pleased herself in painting this being, already so singular, with her most brilliant colours. The head, the neck, and the belly are glittering green; the feathers which cover these parts have the lustre and softness of velvet to the eye and to the touch; the back is changeable violet; the wings are of the same colour, and appear, according to the lights in which they are held, blue, violet, or deep black, always, however, imitating velvet. The tail is composed of twelve feathers; the two middle are the longest, and the lateral ones gradually diminish: it is violet or changeable blue above, and black beneath. The feathers which compose it are as wide in proportion as they are long, and shine both above and below with the brilliancy of polished metal. Above the wings, the scapulars are very long and singularly formed; their barbs are very short on one side and very long on the other. These feathers are of the colour of polished steel, changing into blue, terminated by a large spot of brilliant green, and forming a species of tuft or appendage at the origin of the wings. Below the wings spring long curved feathers directed upwards: these are black on the inside, and brilliant green on the outside. The bill and feet are black." (' Voy. à la Nouvelle Guinée.') Lesson states that he procured several individuals of this gorgeous species on the coasts of New Guinea, where it appears to be common. We are not aware that the structure of the tongue is known, and its present situation is provisional.

We shall here pass from the Tenuirostral families, and revert to some forms in other sections of the Insessorial order, which we have as yet omitted to notice; and first we invite attention to a group or genus of the Fissirostral tribe, termed by Vieillot, Artamus (ἄρταμος, butcher), and by Cuvier, more appropriately, Ocypterus (swift-wing). The former name, however, has the right of priority. These birds, says Cuvier, have the beak conical, rounded, without a ridge, and very slightly arched at the tip, which is sharp; the upper mandible presents merely the trace of a notch on each side; the tarsi are short; the wings even pass beyond the tail, and they have the same rapidity of flight as the swallows, but to it they add the courage of the shrikes, and fear not even to attack the raven. They are natives of Australia, India, and the isles of the Indian Seas. They are continually on the wing in chase of insects.

The French terms given by Cuvier are "Les Langrayens, ou Pies-grièches-Hirondelles." Mr. Swainson calls them Swift-Shrikes. By the colonists of Australia they are designated wood-swallows. Cuvier and most naturalists have placed these birds with the shrikes; but we think that Mr. Gould's observations on their habits will corroborate our opinion respecting their situation among the Fissirostres; indeed Sonnerat's account of the Indian wood-swallow (Artamus leucorhynchos, Pie-grièche-Dominiquaine des Philippines) is a sufficient testimony. He states that this bird flies with rapidity, poising itself in the air like the swallows, and is, moreover, an inveterate enemy to the crow, which, in spite of the superiority of size possessed by that antagonist, it not only dares to oppose, but to provoke.

Of the Australian species Mr. Gould has described and figured six in his splendid work on the birds of that portion of the globe.

1685.—The Common Wood-Swallow

(*Artamus sordidus*). The Sordid Thrush, Turdus sordidus, Latham; Ocypterus albovittatus of Cuvier; Artamus lineatus, Vieillot; Artamus albovittatus, Vigors and Horsfield; Leptopteryx albovittata, Wagler; Be-wo-wen of the aborigines of the lowland and mountain districts of Western Australia; and Worle of the aborigines of King George's Sound. According to Mr. Gould, whose history of these birds we follow, the present species has an extensive range from east to west on the continent of Australia, and is spread over the southern portion, being also found in Van Diemen's Land. Its northern range is not accurately known, but no specimens have been received from the north coast. In Van Diemen's Land it is as migratory as our swallows in England, arriving in October, the beginning of the Australian summer, and after rearing two broods departing northwards, that is, towards warmer latitudes. On the continent of Australia it is only partially migratory, for though the great body leave their summer haunts, still in favourable districts where insect food is abundant some remain stationary throughout the year. The birds bred in Van Diemen's Land, according to Mr. Gould, are larger than those either of the Swan River district, of South Australia, or of New South Wales; and this difference he attributes to a superabundance of food in that humid island. May not the species be distinct?

In the situation of its nest this bird is not bound by any definite rule, varying the site accordingly to circumstances. Mr. Gould saw one in a thickly-leaved bough near the ground, some in naked forks, others on the side of the bole of a tree, in niches formed by a portion of the bark being separated from the trunk. The nest (Fig. 1686) is rather shallow, of a rounded form, composed of fine twigs neatly lined with fibrous roots. The eggs, which are generally four in number, differ in the disposition of their markings. The ground-colour is dull white, spotted and dashed with dark umber brown; in some a second series of greyish spots were observed, as if on the inner surface, and showing themselves through the shell. The nests of the Van Diemen's Land variety were found to be larger, more compact, and more neatly formed than those on the continent of Australia.

Mr. Gould thus details the remarkable habits of these birds, in the work to which we have already alluded:—

"This wood-swallow, besides being the commonest species of the genus, must, I think, be rendered a general favourite with the Australians, not only from its singular and pleasing actions, but by its often taking up its abode and incubating near the houses, particularly such as are surrounded by paddocks and open pasture-lands skirted by large trees. It was in such situations as these in Van Diemen's Land, at the commencement of spring, that I first had an opportunity of observing this species; it was then very numerous on all the cleared estates on the north side of the Derwent, about eight or ten being seen on a single tree, and half as many crowding one against another on the same dead branch, but never in such numbers as to deserve the appellation of flocks: each bird appeared to act independently of the other; each, as the desire for food prompted it, sallying forth from the branch to capture a passing insect, or to soar round the tree and return again to the same spot; on alighting, it repeatedly throws up and closes one wing at a time, and spreads the tail obliquely prior to settling. At other times a few were seen perched on the fence surrounding the paddock, on which they frequently descended, like starlings, in search of coleoptera and other insects. It is not, however, in this state of comparative quiescence that this graceful bird is seen to the best advantage; neither is it that kind of existence for which its form is especially adapted; for although its structure is more equally suited for terrestrial, arboreal, and aërial habits than that of any other species I have examined, the form of its wing at once points out the air as its peculiar province; hence it is that, when engaged in pursuit of the insects which the serene and warm weather has enticed from their lurking-places among the foliage to sport in higher regions, this beautiful species in these aërial flights displays its greatest beauty, while soaring above in a variety of easy positions, with its white-tipped tail widely spread. Another very extraordinary and singular habit of this bird is that of clustering like bees on the dead branch of a tree: this feature was not seen by me, but by my assistant, Mr. Gilbert, during his residence at Swan River; and I have here given his account in his own words:—'The greatest peculiarity in the habits of this bird is its manner of suspending itself in perfect clusters, like a swarm of bees; a few birds suspending themselves on the under side of a dead branch, while others of the flock attach themselves one to the other, in such numbers that they have been observed nearly of the size of a bushel measure.' It was very numerous in the town of Perth until about the middle of April, when I missed it suddenly, nor did I observe it again until near the end of May, when I saw it in countless numbers flying, in company with the common swallows and martins, over a lake about ten miles north of the town; so numerous in fact were they, that they darkened the water as they flew over it. Its voice greatly resembles that of the common swallow in character, but is much harsher."

Fig. 1687 represents a swarm of these birds clustering like bees.

The general colour of this species is black, belly and upper parts of the rump white; tail-feathers, except the two middle, tipped with white; bill greyish; legs black.

1688.—The Cinereous Wood-Swallow

(*Artamus cinereus*). The range of this species exceeds even that of the preceding. It is a native of Timor, and occurs both on the eastern and western coast of Australia, in which latter locality it was observed by Mr. Gilbert. It is the largest of the Australian Artami. In Western Australia, according to Mr. Gould, this bird, though rather local in its distribution, is by no means uncommon, particularly at Swan River, where it inhabits the limestone hills near the coast, and the Clear Hills of the interior, assembling in small families, and feeding not only upon insects, which it takes like the rest of the genus, but also upon the seeds of the Xanthorhœa; such indeed is the eagerness with which they devour the seeds of this grass-tree, that several may be often seen at a time crowded together on the perpendicular seed-stalks of the plant, busily engaged in extracting them. Among the limestone hills, however, where grass-trees, and indeed trees in general, are few, these birds visit the broken rocky ground in quest of insects and their larvæ.

The present species breeds in October and November, making a deeper and more cup-shaped nest than the other members of the group. It is composed sometimes of fibrous roots lined with hair-like grasses, and sometimes of grass-stems and other herbage. It is placed either in a scrubby bush or amongst the leaves of the Xanthorhœa. The usual colour of the eggs is bluish white blotched with lively reddish brown, intermixed with obscure spots and purplish grey dashes, the markings most numerous towards the larger end; there is, however, great variety both in colour and in the character of the markings. The next subject to which we would advert is the genus Troglodytes.

This genus, which comprises the true Wrens, is placed by Mr. Selby in the family Certhiadæ (or Creepers), and this we believe to be its true situation.

1689.—The Common Wren

(*Troglodytes Europæus*). This is the Troglodyte, Roytelet, Beuf de Dieu, Berichot, and Roy Bertaud of the French; Reillo, Regillo, Reotino, Reatin, Fiorracino, Sericciolo, Re d'Uccelli, and Sbuccafratte of the Italians; Nelle Konge of Brunnich, Schneekönig, Konickerl, and Zaunschlupfrel of Kramer; Zaun Sanger of Meyer; Haus und Waldzaunkönig of Brehm; Katy or Kitty Wren, and Kitty, provincial English; Dryw of the ancient British.

This well-known bird is spread over the whole of Europe, and is everywhere noted for its familiarity and its sprightly habits. In our island it is very common, and braves the severity of our winter, flitting from spray to spray, and traversing the hedge-rows with restless activity. Its actions are very smart, it takes short flights, alights on a twig, towards the bottom of the hedge, flirts up its short tail, utters a cry like *chit-chit*, and disappears in the maze of branches like a mouse, passes out on the other side, and repeats its flight. In the depth of winter it frequents farm-yards, cow-sheds, and similar places, both for the sake of shelter and food. The song of this bird is varied and pleasing, and small as the warbler is, its notes are loud and clear. We have often seen it on a sunshiny day, even in the middle of winter, perched on a naked twig, singing with great vivacity, evidently cheered by the transient gleam.

Throughout the greater part or whole of Europe the wren is King of Birds, Little King, King of Cold, Snow-King, &c. (Te degli Uccelli, Roitelet, Roi de Froidure, Schnee-König, &c.); but what has given rise to this title, which is as old as Aristotle, who says it is called Πρεσβυς και Βασιλευς, Elder and King, it is impossible to conjecture.

The wren breeds early, and begins to prepare its nest in March; and various are the places chosen as a site, sometimes under the thatched covering of an outhouse, sometimes in a niche or cavity between the branches of a tree, often amidst the ivy covering aged trees or old walls, or the side of a hayrick. It is a domed structure with a small lateral aperture; generally it consists externally of green moss, but it varies the material according to situation and the colour of the objects around; on a stump or rock, for example, grey lichens and withered grass compose its outer coating: internally it is lined with hair, feathers, wool, and other soft materials. We have seen nests of this composed of fine dried grasses or hay, mixed with bits of leaves, moss, and lichens.

The eggs are usually from six to eight in number, of a yellowish white, sprinkled, especially at the larger end, with reddish brown. It is a curious circumstance that the wren often makes several nests, deserting them when they are finished or nearly so; these it is asserted are the work of the male exclusively, during the incubation of the female, who labours, as it has been said, for the sake of doing something, but never lines them with feathers. Are they not rather structures which some circumstances have prevented the pair from finishing? Fig. 1690 is the nest of the Wren.

Other species besides the present have had the name of wren applied to them; of these we may notice the Gold-crest (Regulus auricapillus), often termed the Golden-crested Wren.

1691.—The Gold-Crest

(*Regulus auricapillus*). The genus Regulus enters into the family Sylviadæ, and, according to Mr.

ORDER GYRATORES.

In the 'Specchio Generale del Sistema Ornitologo,' the Prince of Canino regards the pigeon tribe as an order, under this title—"Order 1, Columbæ," but in his 'Comparative List of the Birds of Europe' he places these birds in the third section of his Passeres, under the title Gyrantes In Mr G R Gray's arrangement they constitute the fourth order, termed Columbæ Cuvier places them at the end of the Gallinaceous order, and Mr Vigors considered them to be an aberrant family of the same order On the contrary Meyer regarded them as a distinct order, Temminck arranged them as his ninth order, and De Blainville has also thrown them into an order, which he calls Sponsores, ou les Columbins, and which he places between the Passeres (Insessores) and the pheasants and partridges (Rasores)

That these birds constitute a distinct order there can be no doubt, certainly they do not belong to the Insessorial order, nor yet to the Rasorial The Rasorial birds are mostly polygamous, the females lay many eggs, the young are not fed by the parents, but in a few hours after exclusion from the egg, run about and pick up their food for themselves, moreover the hind-toe is articulated high on the tarsus, instead of on the same plane as the anterior toes. On the other hand, the pigeons mate and form permanent attachments, the females lay only two eggs, often in nests on the branches of trees, the young are long incapable of leaving the nest, and are at first fed with a milky secretion produced by certain glands arranged on the inner surface of the crop of both parents, and which soon passes in a curdled state, about the third or fourth day grain moistened and warmed in the crop of the parents begins to be added, the hind-toe is on the same level as the others, though the feet are not firm graspers; and, to conclude, the habits, manners, instincts, and voices of these birds are peculiar to themselves. The name of the order here adopted is a modification of the word Gyrantes, used by the Prince of Canino—and thus altered for the sake of uniformity, as Raptores, Incessores, Grallatores, Scansores,—Gyratores. It alludes to the ordinary mode of flight displayed by the birds in question.

If rigidly analysed, this order would be found to contain three or four families; but into these questions we must not wander; we shall, therefore, follow the usual routine.

wards grain macerated in the crop is added, and gradually increased Fig 1694 presents us with two views of the crop, turned inside outwards and distended with spirits —A, the crop of a pigeon when it had no young B, the crop of a male pigeon during the time of rearing the young, *a*, the inner surface of the gullet or œsophagus, *b*, the portion of œsophagus leading from the crop to the gizzard, with the glands for secreting gastric juice, *c*, the inner surface of the crop, which in B displays the glandular structure, as developed during the breeding season, the glands at that time assuming a new character and office, and secreting the milky fluid in great abundance The analogy between these glands, their temporary development for a given purpose, and the mammary glands of quadrupeds, need not be insisted on.

1695 —A Group of Pigeons,

a, the Pouter, *b*, the Carrier, *c*, the Jacobin, *d*, the Ringdove, or Cushat, *e*, the Rockdove (the origin of our domestic birds), *f*, the Fan tailed Pigeon, *g*, the Nun, *h*, the Tumbler.

1696 —The Carrier Pigeon.

One of the domestic varieties of Columba livia.

1697 —Pigeon-Towers in Persia

At what period man added the pigeon to his list of domestic retainers of the feathered race is not very clear, but it was evidently at a remote period We find abundant references to it in the classical writers, and we know that it was among the clean animals according to the law of Moses In the East the dove or pigeon has always been regarded with favour, and has been employed time immemorial as a carrier of letters or written messages, its rapidity of flight, its almost unerring instinct in finding its way home, and the eagerness with which it returns to its dwelling, recommending it for such a use In Persia and other parts of the East pigeons are kept in multitudes for the sake of the manure produced * towers are built on the outskirts of the towns for them, and vast clouds of these birds may be seen issuing from them, returning to them, or wheeling in the air around their pinnacles. The passage in Isaiah (lx 8), "Who are these that fly as a cloud, and as the doves to their windows," is, as Mr. Morier has observed, illustrated by reference to those pigeon towers which he noticed around the outskirts of Ispahan With respect to the extraordinary flights of these birds, he says, "Their numbers, and the compactness of their mass, literally looked like a cloud at a distance, and obscured the sun in their passage." It is probable that the Jews, requiring pigeons as they did for offerings at the Temple (Fig 1698), built similar towers the Egyptians certainly did, as is proved by ancient paintings and the mosaic pavement at Præneste, where pigeon-towers similar to those of Ispahan are represented but without the conical crowns

Of all our domestic pigeons none equal the carrier in rapidity of wing and powers of endurance. It was originally brought to Europe from the East, and Lithgow, the traveller, tells us that one of them will carry a letter from Babylon to Aleppo, which is thirty days' journey, in forty-eight hours It is recorded that a gentleman of Cologne, having busi-

be short, we can easily conceive that the bird making wide circles at a great elevation may at one part of the circle discern some known object, which will at once indicate the direction to be followed. A circle of three or four miles would give the bird the command of a very wide extent of country, and a tall object, as a spire, previously visited voluntarily or seen from its abode, would afford the desired clue. This perhaps may account, in ordinary cases, for the return of the pigeon to its home, but it will not account for the return of the bird from great distances. We hear of pigeons being brought from towns on the Continent, as Brussels, &c, and set at liberty in London, and of their return in a comparatively short space of time, few of the number failing to find their way Trials of this kind have been often repeated, and, unless the weather proves misty or fogs hang over the sea, the birds cross the Channel safely and regain their home That they are sometimes dispersed and lost in foggy weather proves that they use their sight in pursuing their homeward course but still the difficulty remains—how is that course determined? The same difficulty meets us in the migration of the swallow. Its winter abode is Western Africa. It finds its way to the African shores, and returns again to Europe but what is more, the same pair will steer not only for England, but for the very chimney or barn which they habitually tenant as their summer, breeding-place, and it is probable that they visit a determinate spot in Africa It is one of the facts in natural history which we must be content to leave unexplained

It is from the rock-dove, says Selby, "that most of our curious varieties of pigeon have arisen, for some later ones may have been derived from crosses with other species" What these other species are we are not informed

In Europe and the British Isles we have the following wild species of the genus Columba —The Ringdove, Cushat or Quest (Columba Palumbus); the Stockdove (Col œnas), the Rockdove (C. livia), and the Turtle-dove (C turtur)

The Ringdove is the largest of our wild pigeons, and is common in the wooded districts of our island, as well as of the greater portion of Europe. In the winter it assembles in numerous flocks, which resort to the stubble-lands in quest of food. It devours all kinds of grain, peas, beech mast, acorns, berries, and the green leaves of the turnip. During this season of the year its numbers are often increased by the arrival of flocks from the more northern parts of Europe, but in our island, and in France and the southern countries, it is not migratory No naturalist has regarded the ringdove as identical with the domestic pigeon. Its mode of building its nest, a flat platform of twigs laid crossways on the fork of a branch—its size—its refusal when in captivity to breed with the pigeon—and the failure of every attempt to reduce it to a state of domestication are of themselves, setting aside colouring, sufficient proofs of specific distinctness

Still more remote from the common pigeon is the Turtle-dove, a bird of passage, and one of the spring visitors to our shores

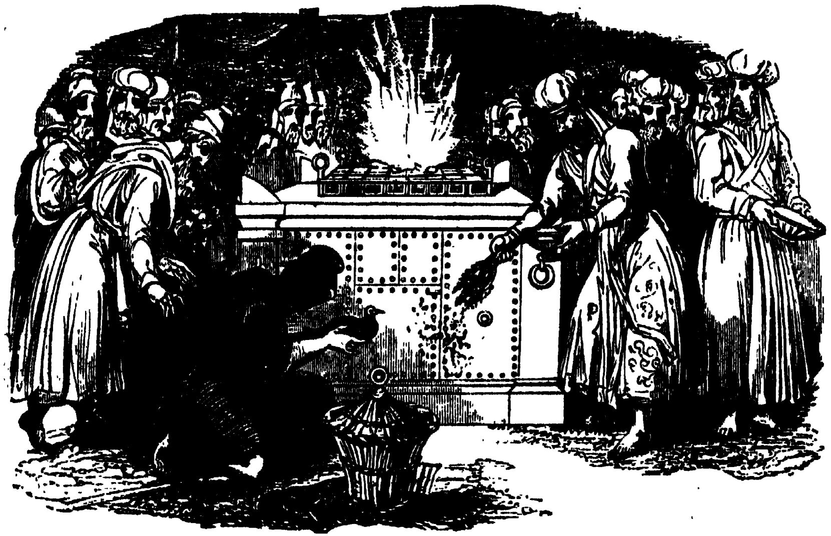
The Stockdove derives its name from being, as was presumed, but erroneously, the stock to which the common pigeon is referable. This error arose, no doubt, from our early ornithologists having confounded the stockdove with the rockdove, and so mixed up the history of both. Montagu, in his 'Dictionary of Ornithology,' confounds these birds together, deeming the Columba livia and the C œnas to be identical. His description, however, refers to the C. livia (Rockdove); and it would

---

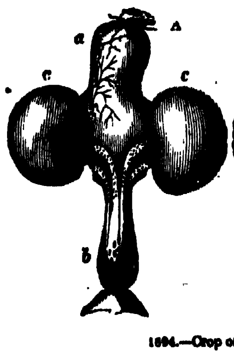
* Mr Morier states that "the dung of doves is the dearest manure which the Persians use, and as they apply it almost entirely to the rearing of melons, it is probably on that account the melons of Ispahan are so much finer than those of other cities The revenue of a pigeon-house is about a hundred tomauns per annum, and the great value of this dung, which rears a fruit that is indispensable to the existence of the natives during the great heats of summer, will probably throw some light on that passage in Scripture in 2 Kings vi. 25.

1598.—Nest of Turtle-Dove.

1597.—Pigeon-Towers in Persia.



1596.—Offering of Pigeons required by the Jewish Law.

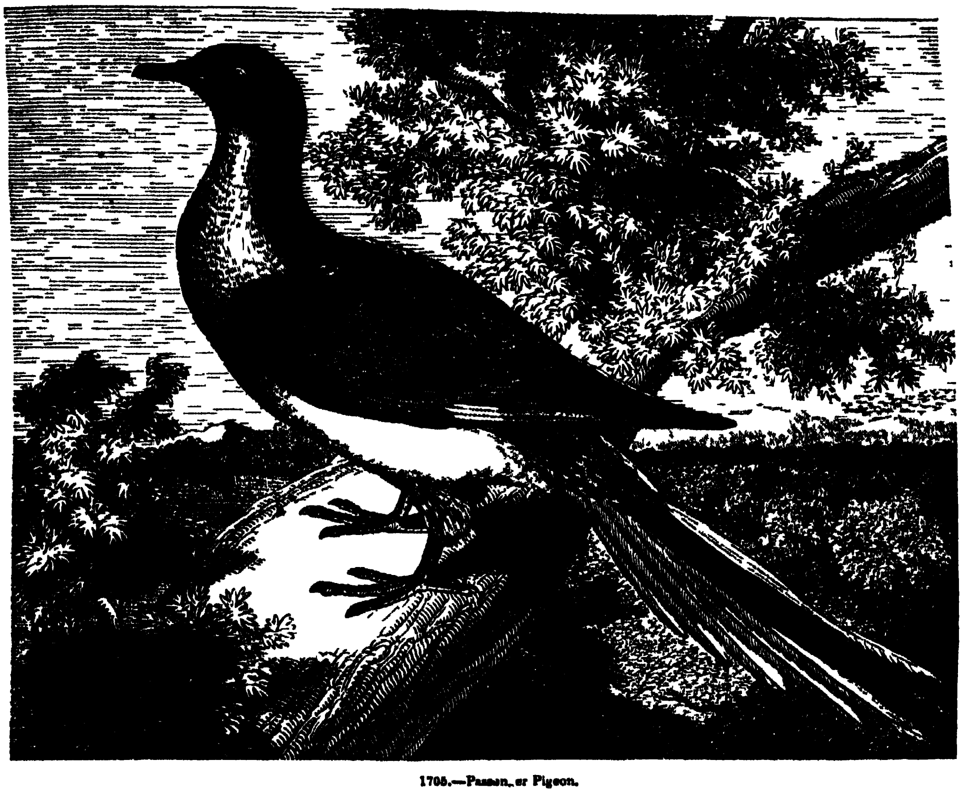


1594.—Crop of Pigeon.

1697.—Manasope Pigeon

1704 —Collared Turtle

1700.—Chestnut-shouldered Pigeon.



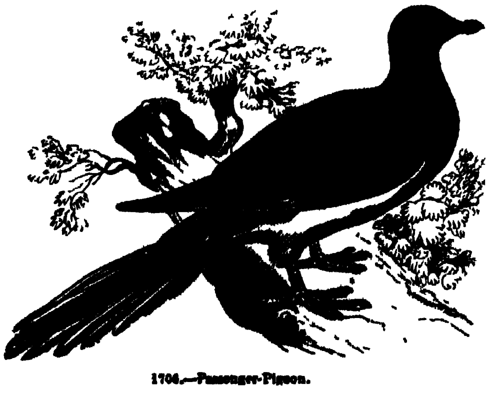
1705.—Passen_er Pigeon.

1703.—Collared Turtle

1702 —Turtle Dove

1698.—Rock-Dove.

1701.—Double-crested Pigeon.



1706.—Passenger-Pigeon.

seem that he was unacquainted with the true C. œnas.

White, in his 'History of Selborne,' well distinguishes the stockdove and the "small blue rock-pigeon," observing that "unless the stockdove in winter greatly varies from itself in summer, no species seems more unlikely to be domesticated and to make a house-dove. We very rarely see the latter settle on trees at all, nor does it ever haunt the woods: but the former, as long as it stays with us, from November perhaps to February, lives the same wild life with the ringdove: frequents coppices and groves, supports itself chiefly by mast, and delights to roost in the tallest beeches. Could it be known in what manner the stockdoves build, the doubt would be settled with me at once, provided they construct their nests on trees, like the ringdove, as I much suspect they do."

From this it appears that White had only a partial degree of information respecting the stockdove. This bird is indigenous in our island, breeding in the woods; but its localities are circumscribed. In winter the flocks are increased by accessions from the northern provinces of Europe; but these visitants depart in spring.

In our island the stockdove limits its range almost exclusively to the midland counties, and is common in Hertfordshire. It is rarely seen in the southern or western counties, and still more rarely in the northern. This bird makes a nest of twigs, in the holes of decayed and timeworn trees, and in cavities on the top of pollards, but never places it on the forked or spreading branches of a tree.

As is the case with all the dove tribe, its eggs are two in number.

The stockdove is not only found in Europe, but in the northern provinces of Africa, and in various parts of Asia. We have seen specimens from the neighbourhood of Trebizond and Erzerum, where it is said to be common.

Selby thus details the colours of the stockdove: "Head and throat deep bluish grey; sides of the neck glossed, with different shades of green and purple; the feathers shorter and more distinct than those of the rockdove; lower parts of the neck and breast pale lavender-purple; belly, thighs, and under tail-coverts bluish grey, with a slight purplish tinge; back deep bluish grey; wing-coverts paler, and some of the greater ones spotted and barred with black, but not forming any defined bar as in the above-mentioned species. Quills blackish grey, the outer webs near the base of the feathers passing into bluish grey: lower part of the back and tail-coverts bluish grey; tail bluish grey, with a broad black bar at the end, and having the outermost feathers margined with white; iris brownish red; legs and toes bright cochineal-red."

As we have already stated, the stockdove has been confounded with the rockdove, and the characters of the latter have been consequently given as those of the former. The rockdove, however, is a totally distinct species, and its habits are unlike those of any other of our Columbæ. As its name imports, it frequents rocks and precipices, especially along the sea-coast, and is far from being uncommon. It is partial to deep caverns, in which it breeds. It haunts the caves in the cliff at St. Abb's Head, on the Berwickshire coast: those in the Isle of Bass; of Caldy Island, South Wales; and of the wild precipices of the Orkneys. We have seen it frequenting the steeples of churches near the coast, and have remarked numbers inhabiting the holes and crevices in the higher parts of Canterbury Cathedral. In the latter instances it may be said that the birds are merely the emancipated descendants of our domestic breed. If so, with their freedom they have regained their genuine colours in most instances.

We have seen many specimens from Northern Africa and Western Asia. Selby states that it is numerous in the rocky islands of the Mediterranean, where it lives and breeds in caverns on the shore; in the island of Teneriffe it is met with in incredible numbers.

The rockdove is more slender than the stockdove, and is astonishingly rapid in flight. It may at once be distinguished from the latter by the white colour of the lower part of the back, and the two distinct bands of leaden black across the wings. These distinctive marks are found in our ordinary dovecote pigeons; and when in the fancy kinds they become, by the breeder's art, imperceptible, they are ever ready to return, and hence one of the difficulties of keeping up a particular fancy stock. It is, then, to the rockdove, a species almost universally spread in its wild state throughout the Old World, that the domestic pigeon and its varieties must be referred. All these varieties breed with each other, and with the wild rockdove; and without due care, all soon degenerate, as it is termed, and acquire the original form and colouring.

The habits and manners of the domestic pigeon are too well known to require detailing, nor need we enter into their numerous varieties.

1699.—The Rock-Dove

(*Columba livia*). Le Biset, and Le Rocheraye, Coulon, Colombe, and Pigeon of the French; Palombella, Piccione di Torre, Piccione di Rocca of the Italians; Feldtaube, Haustaube, Hohltaube, Blautaube, and Holtztaube of the Germans; Rock-Pigeon, English; Colommen, ancient British.

We have already, in our notice of the domestic pigeon, entered into the history of this species, which is spread over a great portion of Europe, Asia, and Northern Africa, abounding in the rocky islands of the Mediterranean, and in the Orkneys and Hebrides of our northern sea.

1700.—The Chestnut-shouldered Pigeon

(*Columba spadicea*). This beautiful bird, which appears to resemble our ringdove or cushat in habits, is a native of New Zealand, and is very abundant in the woods near the Bay of Islands, where Lesson killed numbers. Their flesh is excellent.

The colouring is as follows:—All the upper parts and the throat are of a changeable hue, in which are mingled rosy-copper reflexions running into brilliant iridescent tints; the quills are of a more sombre tone. The tail above is brown slightly tinged with greenish, below it is brown; breast and under parts white: bill and tarsi carmine: a bright red skin surrounds the eye. Total length about nineteen inches.

1701.—The Double-crested Pigeon

(*Columba dilopha*). New Holland and Java are the native localities of this species, which is closely allied to the preceding and equally formed for arboreal habits. The head is ornamented with a frontal crest composed of long recurved lax feathers, advancing even on the bill, and of a bluish grey colour tinged with rufous; behind this on the back of the head is a second crest of rich rufous, and composed of long decumbent feathers with open barbules, and bounded by a black streak running back from each eye; bill rich orange; sides and front of the neck, together with the breast, pale grey, the base of the feathers being black, at their end they assume a trifid form; back scapulars and wing-coverts deep bluish grey; quills and secondaries bluish black; under plumage grey; tail square, black at the base, and a narrow bar being of a pale grey with a reddish tinge: legs crimson. Total length about seventeen inches.

1702.—The Turtle-Dove

(*Turtur auritus*, Ray; *Columba Turtur*, Linn.). Tourterelle of the French; Tortora of the Italians; Turteltaube of the Germans; Colommen fair of the ancient British.

Among our summer visitors must be enumerated this interesting bird, which arrives in our island about the beginning of May. It is when nature is clad in her freshest robes of beauty, when the wild flowers garnish our hedgerows, and the thickets resound with the notes of warblers, that the voice of the turtle is heard in our land. In all ages and in all countries visited by it has the turtle been a favourite; its innocence, its beauty, its attachment to its mate, its plaintive voice, and the time of its appearance, combine to give it interest; it is the emblem of peace and tranquillity; and in the strains of poetry its presence is associated with quiet rural life and undisturbed happiness.

> "Hinc altâ sub rupe canet frondator ad auras,
> Nec tamen, interea, raucæ, tua cura, palumbes,
> Nec gemere aëriâ cessabit turtur ab ulmo."
>
> VIRGIL.

The winter residence of the turtle appears to be in Africa: in summer it is spread over southern and temperate Europe, and various parts of Asia. In Greece, Asia Minor, and Italy it is very common. Mr. Strickland observed it at Smyrna, in April, 1836. In our island it is much more abundant in the southern and eastern counties than in those farther north: we have seen it in numbers both in Essex, Kent, and Surrey. Thick copses, wooded parks, dense hedgerows, where bushy pollard oaks rise up at intervals, are its favourite places of resort; and in secluded retreats, several pairs are often found to form a sort of colony, building their nests in adjacent trees. The nest, as previously noticed, is a platform of twigs, and is placed in the forked branch of an oak or fir tree, among the ivy-laden boughs of the elm, near the stem, or in thick pollards; we once saw the nest of a pair of turtles in a stunted pollard oak, close to the gate of a farmyard in Essex, and watched the birds playfully chasing each other in the air around the tree. Early in the morning the turtle wings its way from the copse or park to the fields in quest of food, and it repeats its visit in the afternoon, returning home on the approach of dusk. Various kinds of grain, as wheat, not yet mature, together with peas, rape, mustard-seed, hemp-seed, &c., constitute its diet. On the approach of autumn the turtle congregates in small flocks of ten or twelve, which scour the fields during the day, and return to their roosting-places in the evening. Early in September this bird leaves our island for its winter abode; sometimes however it lingers till the close of the month before taking its departure.

The turtle is about eleven inches in length. The upper part of the head and neck is ashy grey, with a pearly tinge: the back is brown; the wing-coverts are dusky brown in the centre, with a border on each feather of reddish brown inclining to rufous; quills brown; tail-feathers dusky brown, and all, with the exception of the two middle, tipped with white. The sides of the neck present a patch of small stiff black feathers with white margins; front of the neck and breast light vinous; abdomen white. The young birds are destitute of the peculiar patch of feathers on the sides of the neck.

1703, 1704.—The Collared Turtle

(*Turtur risorius*). Columba risoria. This beautiful bird is often kept in aviaries, where it freely breeds. It is widely spread, being dispersed throughout the whole of Africa, India, and other parts of Asia. Colonel Sykes found it in Dukhun. The collared turtle was well known to the ancients, and is still common in Egypt and the neighbouring countries. It has been suggested that this species is the turtle of the Scriptures; we are not however so sure of it, for it does not appear that this is a migratory bird, which that decidedly was. In its natural state the collared turtle frequents the woods, and its habits closely agree with those of the common species. The general colour is pale fawn, with a black crescent-shaped mark on the back of the neck. Length about eleven inches.

1705, 1706.—The Passenger-Pigeon

(*Ectopistes migratoria*). Were not the testimony of Wilson, Audubon, and others who have described the habits of this bird above suspicion, one might be tempted to think that their accounts were somewhat overcoloured; such however is not the case: they narrate, graphically, scenes of which they were themselves eye-witnesses. The passenger-pigeon is a native of America (where it is generally termed the wild pigeon), and is celebrated for inundating in flocks of thousands various districts to which the hordes are attracted by food, their visits being irregular and uncertain. The passenger-pigeon is a bird of extremely rapid flight, propelling itself by quickly repeated flaps of the wings, as it passes along in a straight course over the country. During the pairing season however it often flies in circles, occasionally clashing its wings in the manner of the domestic pigeon, which in its manners it generally resembles. Speaking of the rapidity of the present species, Mr. Audubon states that "Pigeons have been killed in the neighbourhood of New York with their crops full of rice, which they must have collected in the fields of Georgia and Carolina, these districts being the nearest in which they could possibly have procured a supply of this kind of food. As their power of digestion is so great that they will decompose food entirely in twelve hours, they must in this case have travelled between three hundred and four hundred miles in six hours, which shows their speed to be at an average about one mile in a minute.

"This great power of flight is seconded by as great a power of vision, which enables them as they travel at that swift rate to inspect the country below, discover their food, and thus attain the object for which their journey was undertaken.

"The multitudes" (says Audubon, whose account we follow) "of wild pigeons in our woods are astonishing. Indeed, after having viewed them so often and under so many circumstances, I even now feel inclined to pause, and assure myself that what I am going to relate is fact:—In the autumn of 1813 I left my house at Henderson on the banks of the Ohio on my way to Louisville. In passing over the Barrens a few miles beyond Hardensburgh I observed the pigeons flying from north-east to south-west, in greater numbers than I thought I had ever seen them before; and feeling an inclination to count the flocks that might pass within the reach of my eye in one hour, I dismounted, seated myself on an eminence, and began to mark with my pencil, making a dot for every flock that passed. In a short time finding the task I had undertaken impracticable, as the birds poured in in countless multitudes, I rose, and, counting the dots then put down, found that one hundred and sixty-three had been made in twenty-one minutes. I travelled on and still met more the farther I proceeded. The air was literally filled with pigeons; the light of noon-day was obscured as by an eclipse, and the continued buzz of wings had a tendency to lull me to repose.

"Before sunset I reached Louisville, distant from Hardensburgh fifty-five miles; the pigeons were still passing in undiminished numbers, and continued to do so for three days in succession. The people were all in arms. The banks of the Ohio were crowded with men and boys incessantly shooting at the pilgrims, which there flew lower as they passed the river." Multitudes were destroyed. For a week or more the population fed on no other flesh than that of pigeons, and talked of nothing but pigeons. The atmosphere during this time was strongly impregnated with the peculiar odour which emanates from the species." After these details Mr. Audubon proceeds to reckon the number of individuals in a single flock, and that not a large one, extending one mile in breadth and one hundred and eighty miles in length, allowing two pigeons to each square yard. The product is one billion one hundred and fifteen millions one hundred and thirty-six thousand. The flock takes three hours in passing any given spot. What must be the quantity of food required for such a legion! "As every pigeon daily consumes fully half a pint of food, the quantity necessary for supplying this vast multitude must be eight millions seven hundred and twelve thousand bushels per day."

Where food, such as beech-mast, is abundant, strewing the ground, these flocks wheel round and alight, and the woods are filled with their numbers. About the middle of the day, after their repast is finished, they settle on the trees to enjoy rest and digest their food. "As the sun begins to sink beneath the horizon they depart *en masse* for the roosting place, which not unfrequently is hundreds of miles distant, as has been ascertained by persons who have kept an account of their arrivals and departures.

"One of these curious roosting-places on the banks of the Green River in Kentucky I repeatedly visited. It was, as is always the case, a portion of the forest where the trees are of great magnitude, and where there was little underwood. I rode through it upwards of forty miles, and found its average breadth to be rather more than three miles. My first view of it was about a fortnight subsequent to the period when they had made choice of it, and I arrived there nearly two hours before sunset. Few pigeons were then to be seen, but a great number of persons with horses and waggons, guns and ammunition, had already established encampments on the borders. Two farmers, from the vicinity of Russelsville, distant more than a hundred miles, had driven upwards of three hundred hogs to be fattened on the pigeons that were to be slaughtered. Here and there the people employed in plucking and salting what had already been procured were seen sitting in the midst of large piles of these birds. Many trees two feet in diameter I observed were broken off at no great distance from the ground, and the branches of many of the largest and tallest had given way as if the forest had been swept by a tornado. Everything proved to me that the number of birds resorting to this part of the forest must be immense beyond conception. As the period of their arrival approached, their foes anxiously prepared to receive them, some were furnished with iron pots containing sulphur—others with torches of pine-knots—many with poles, and the rest with guns. The sun was lost to our view, yet not a pigeon had arrived. Everything was ready, and all eyes were gazing on the clear sky which appeared in glimpses amidst the tall trees. Suddenly there burst forth a general cry of 'Here they come.' The noise which they made, though yet distant, reminded me of a hard gale at sea, passing through the rigging of a close reefed vessel As the birds arrived and passed over me I felt a current of air that surprised me. Thousands were soon knocked down by the pole-men, the birds continued to pour in; the fires were lighted, and a most magnificent as well as wonderful and almost terrifying sight presented itself The pigeons arriving by thousands alighted everywhere, one above another, until solid masses as large as hogsheads were formed on the branches all round. Here and there the perches gave way with a crash, and falling on the ground destroyed hundreds of the birds beneath, forcing down the dense groups with which every stick was loaded. It was a scene of uproar and confusion; no one dared venture within the line of devastation: the hogs had been penned up in due time, the picking up of the dead and wounded being left for next morning's employment. The pigeons were constantly coming, and it was past midnight before I perceived a decrease in the number of those that arrived. Towards the approach of day the noise in some measure subsided; long before objects were distinguishable the pigeons began to move off in a direction quite different from that in which they had arrived the evening before, and at sunrise all that were able to fly had disappeared. The howlings of the wolves now reached our ears, and the foxes, lynxes, cougars, bears, racoons, and opossums were seen sneaking off, whilst eagles and hawks of different species, accompanied by a crowd of vultures, came to supplant them, and enjoy their share of the spoil." The breeding places of these pigeons are even more extensive than their temporary roosting places; fifty miles in length of forest by four or five in breadth being colonised by them, and every tree crowded with nests, varying from fifty to a hundred in number. The breeding time, according to Audubon, is not much influenced by season, but the territory selected is where food is most plentiful and most easily attainable, and where water is at a convenient distance. The nests are composed of a few dry twigs supported on the forks of the branches. The eggs are two in number, and, as is the case with our common domestic pigeon, the brood consists in general of a male and female. When the young are fully grown, but have not yet left the nests, a scene similar to that described as occurring in their roosting place commences Parties from the surrounding country throng to the onslaught. Trees are cut down, and thousands of the young or "squabs" are taken. While the axemen are at work, the forest presents "a perpetual tumult of crowding and fluttering pigeons, their wings roaring like thunder, mingled with the frequent crash of falling timber" By the Indians, as Wilson says, a pigeon-roost or breeding place is considered an important source of national profit, and dependence for the season, and all their active ingenuity is exercised on the occasion

We have seen several pairs of the migratory pigeon in captivity, it breeds freely in a suitable aviary, and is as contented and tame as our ordinary domestic race.

The migratory pigeon has the head small, the neck slender, the legs short, and the tail, which is composed of twelve feathers, graduated and tapering Bill black, iris bright red, feet carmine purple, claws blackish, head above and on the sides light blue, throat, fore-neck, breast, and sides brownish red, lower part and sides of the neck reflecting metallic tints of gold, emerald, green, and rich crimson, the general colour of the upper parts is greyish blue, some of the wing-coverts marked with a black spot, quills and larger wing-coverts blackish, the primary quills bluish on the outer web, the larger coverts whitish at the tip, the two middle feathers of the tail black, the rest pale blue becoming white towards the end, under parts white. Length sixteen inches and a half. The female is somewhat smaller than the male, and the colours of the plumage are duller, though their distribution is the same. Length fifteen inches.

1707.—The Manasope Pigeon

(*Ptilinopus cyano-virens*). Lesson found this elegant pigeon in the deep forests of New Guinea, and in the neighbourhood of the harbour of Dorey procured numerous individuals Their low cooing, he says, was frequently heard from the large trees, and everything proved that they were common In the Papuan tongue the bird is termed Manasope Lesson's description is as follows—Total length, from the end of the bill to the extremity of the tail, eight inches six lines (French), bill delicate and black, iris of a red brown, tarsi short, and almost entirely feathered, toes with a membranous border, and of a lively orange colour, head, rump, upper part of the body, wings, and tail, of an agreeable grass green; a large hood of a beautiful indigo-blue covers the occiput, elongated blue spots occupy the centre of the subular feathers, which are bordered with a straight yellow line, the internal and hidden part of the same feathers is brown, the quills are entirely brown, and bordered at the external edge with a line of canary yellow, the tail is square and rectilinear, the feathers which compose it are fourteen in number, brown, their extremities white below, and of a green similar to that of the back above, passing into black in the middle, and each terminating within with a white spot, the two exterior ones are brown, bordered with yellow externally, as are the two or three next the shaft is brown, the throat to half-way down the neck is ash grey, the breast is greyish green the belly and the flanks are at first green mingled with some yellow borderings, and then comes a large patch of yellowish white extending on each side so as to form a kind of girdle, the feathers of the thighs are green; those of the vent, white and pale yellow, the lower tail-coverts are yellow mingled with green.

1708.—The Aromatic Vinago

(*Vinago aromatica*). This example of the arboreal pigeons of intertropical Asia and Africa is a native of the continent of India, Java, and the adjacent islands. It is said to climb the trees with great address, and to frequent the banyan, on the small red fig of which it feeds; whilst its colour so blends with that of the foliage that it is difficult, even when a flock is among the branches, to distinguish the birds, unless they flutter about. In the breeding season the pairs retire into the recesses of the forest, and re-assemble into flocks after the young are reared. The nest is a slight platform of sticks and twigs; the eggs, as usual, two.

The bird is thus described:—The base or softer part of the bill is a blackish grey; the tip yellowish white, strong, much hooked, and bulging on the side; the forehead is of a bright siskin green; the crown greenish grey; the chin and throat gamboge-yellow; the remainder of the neck, the breast, belly, lower back, and rump, yellowish green; the upper back or mantle, and a part of the lesser wing-coverts are of a rich brownish red, and exhibit a purplish tinge in certain lights; the greater wing-coverts and secondary quills are greenish black, with a deep and well defined edging of gamboge-yellow throughout their length; the tail has the two middle feathers wholly green, and slightly exceeding the rest in length, these are of a dark bluish grey, with a dark central band; the under tail-coverts are yellowish white, barred with green; the legs and toes are red, the claws pale grey, strong, sharp, and semicircular. (Selby.)

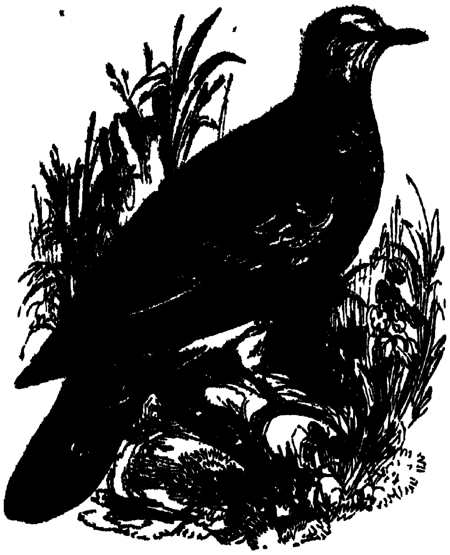
1709.—The Phasianella

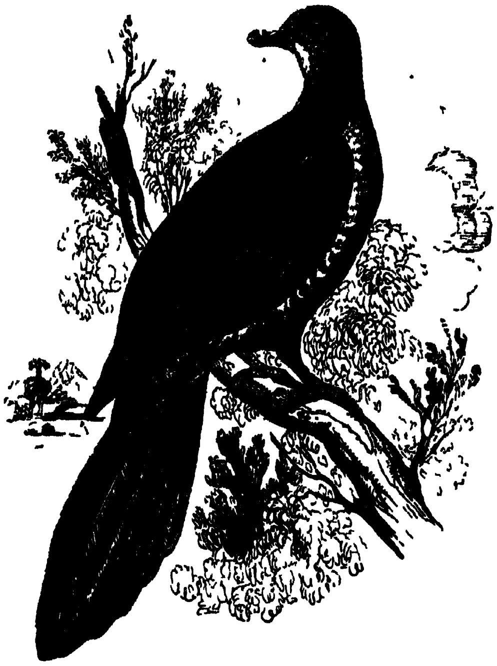
(*Columba Carpophaga Phasianella*). This beautiful species is found in Australia, the Philippine and Molucca Islands, and Java, &c, where it inhabits the woods, feeding on pimento and various other aromatic berries. Its flesh is dark-coloured, but of excellent flavour. The total length of this species is about sixteen inches. The wings are short, the tail long and graduated. The upper plumage is deep reddish brown with bronze reflexions The head, sides, and front of the neck, and whole of the under plumage, are orange brown. The hinder part of the neck changeable violet, purple, and brilliant gold. Legs reddish brown.

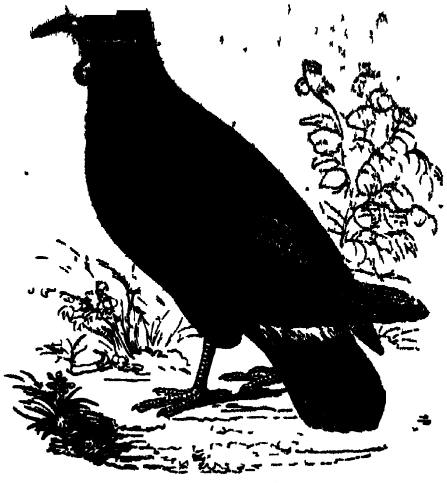
1710—The Oceanic Fruit-Pigeon

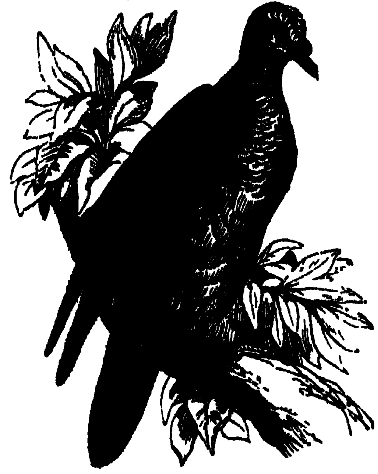
(*Carpophaga oceanica*). The small island of Oualan in the midst of the Caroline Archipelago, the Pelew Islands, and possibly some of the Philippines, are the native localities of this species, which is closely allied to the Nutmeg Pigeon of New Guinea. It is described by Lesson as follows:—Total length fourteen inches (French), including the tail, which measures five, the bill, an inch long, is black, strong, and surmounted at its base by a rounded and very black caruncle; the feet are very strong and of a bright orange colour, the tarsi are feathered nearly down to the toes, which have a well-developed border; the wings are pointed, and only one inch shorter than the tail, which is almost rectilinear. The feathers of the forehead, cheeks, and throat are whitish mixed with grey; the head and the back of the neck are of a deep slaty grey, the back, rump, wing coverts, quills, and tail-feathers, are of a uniform metallic green, passing into brown on the interior of the great feathers; the breast and upper part of the belly are grey, with a tint of rust colour, the lower part of the belly, the vent, the thighs, and the lower tail-coverts, are a deep ferruginous red. the tail-feathers on the under side are a bright reddish green (vert rougeâtre clair). (Lesson)

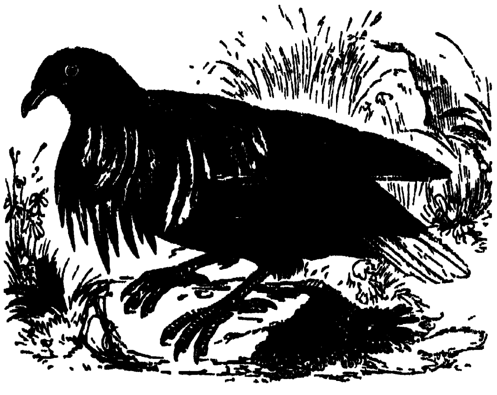
Mr Selby, in reference to the pigeons of the present group, Carpophaga, observes that "their bill is considerably depressed at the base, the membrane in which the nostrils are placed but little prominent or swollen, the tip compressed and moderately arched, the tomia slightly sinuated. The forehead is low, and the feathers advance considerably upon the soft portion of the bill In many of them a caruncle, or gristly knob, varying in size and shape according to the species, grows upon the basal part of the upper mandible during the breeding season. This is supposed to be common to both sexes, as the female is described with it in Duperrey's 'Voyage.' After this epoch it is rapidly absorbed, and its situation scarcely to be observed upon the surface of the bill The feet are powerful, and formed for grasping, the soles being flat and greatly extended As in the other members of this group the hind-toe is fully developed and long, and the exterior longer than the inner toe. They inhabit the forests of India, the Moluccas, Celebes, Australia, and the Pacific Isles. Their food consists of fruits and berries. That of the precious nutmeg, or rather its soft covering, known to us by the name of mace, at certain seasons affords a favourite repast to some species, and upon this luxurious diet they become so loaded with fat as frequently, when shot, to burst asunder when they fall to the ground. And here we may reflect on the remarkable provision Nature has made for the propagation as well as the dissemination of this valuable spice, for the nutmeg itself, which is generally swallowed with the whole of its pulpy covering, passes uninjured through the digestive organs of the bird, and is thus dispersed throughout the group of the Moluccas and other islands of the East. Indeed, from repeated experiments, it appears that an artificial preparation, analogous to that which it undergoes in its passage through the bird, is necessary to ensure the growth and fertility of the nut, and it was not till after many unsuccessful attempts had been made that

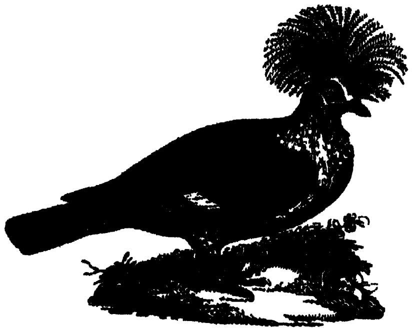

1711.—Bronze-winged Pigeon.

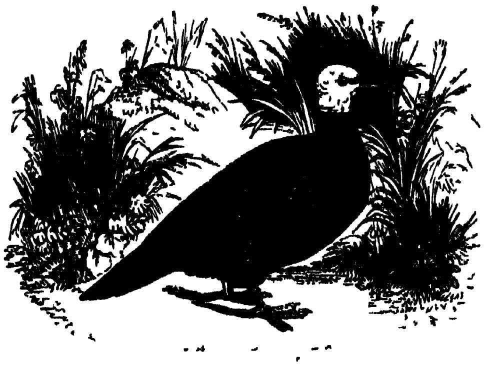

1709.—Phasianella.

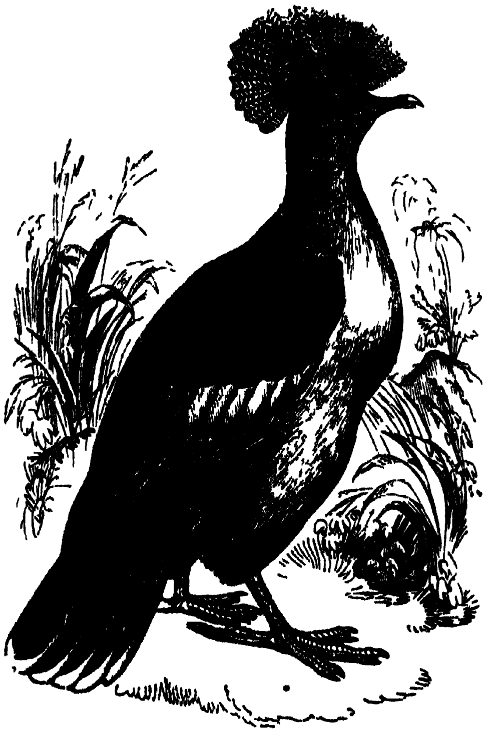

1714.—Wattled Ground-Pigeon.

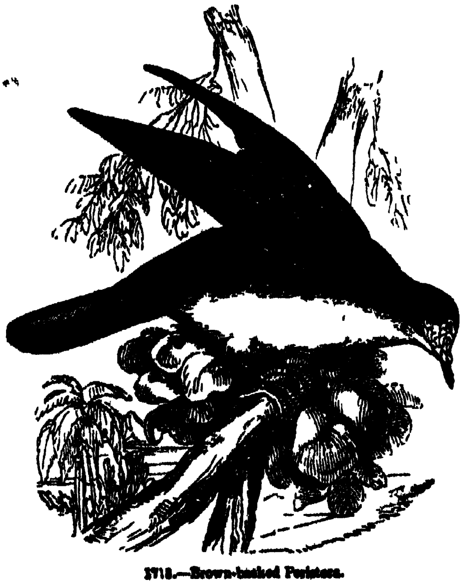

1710.—Oceanic Fruit-Pigeon.

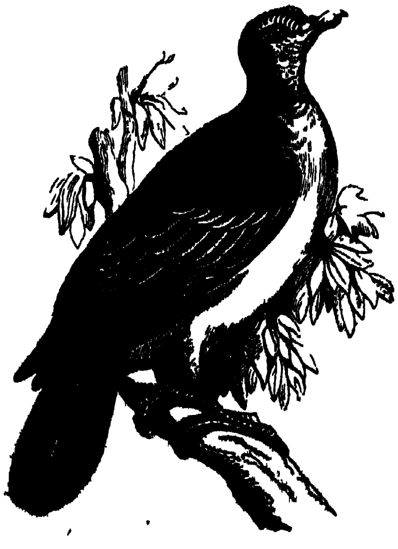

1715.—Nicobar Pigeon.

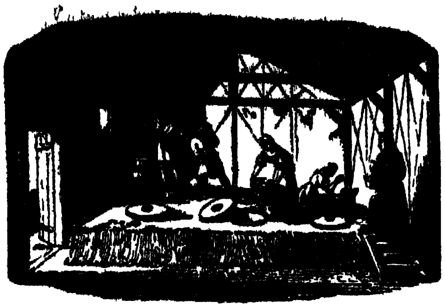

1716.—Crowned Pigeon.


1712.—Talpicoti.

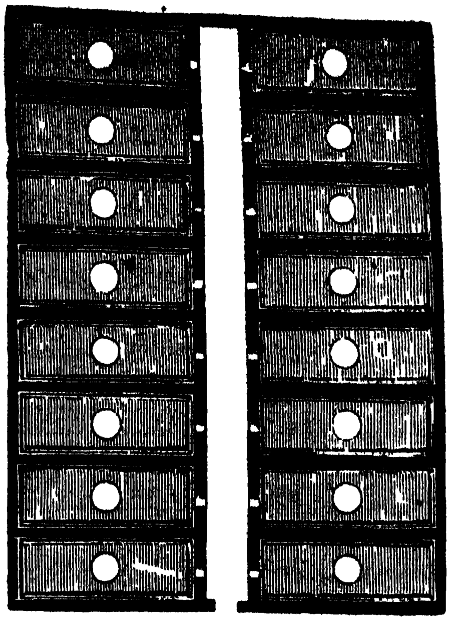

1717.—Crowned Pigeon.


1713.—Brown-backed Peristera.

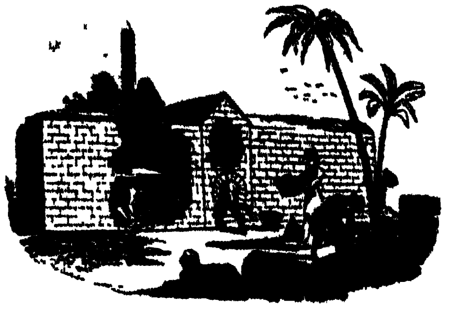

1708.—Aromatic Vinago.



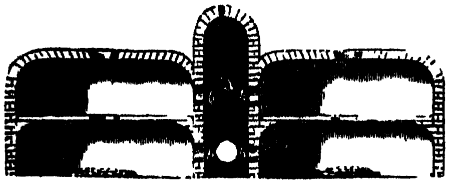
1725.—Hatching Eggs in Dung.



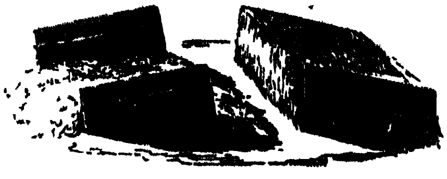
1721.—Ground plan of Egg-Oven.



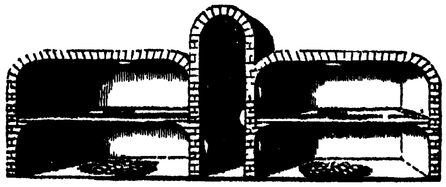
1720.—Egyptian Egg-Oven.



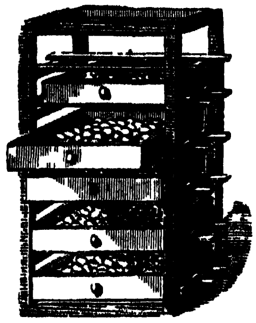
1722.—Egyptian Egg-Oven



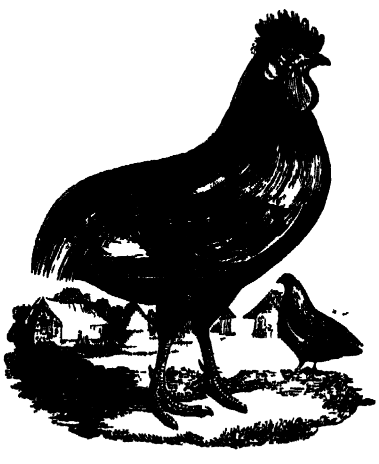
1727.—Artificial Mother.



1723.—Egyptian Egg Oven.



1724.—Egg-Frame



1719.—Persian Cock

1718.—Group of Domestic Poultry.

1726.—Hatching-room at Paris.

a lixivium of lime, in which the nuts were steeped for a certain time, was found to have the wished-for effect, and to induce the germinating tendency. The fruit of the banyan (ficus religiosa), the sacred tree of the Hindoos, is also a favourite repast of all the pigeons of this group, as well as of the stronger-billed Vinago."

1711.—The Bronze-winged Pigeon

(*Phaps chalcoptera*). We now approach a series of species more or less terrestrial in their habits, whence they have by some naturalists been called partridge pigeons: their flight is usually low, and seldom long sustained.

The present beautiful species is a native of Australia, and is common near Sidney from September till February. It frequents dry sandy situations, and is generally seen either on the ground, or perched on low branches or decayed stumps of trees; it is usually seen in pairs; and their voice is loud and sonorous. The nest is placed either in the hole of a mouldering tree or on a stump. The eggs are two, and white. We have seen several pairs of these birds in captivity, but are not aware that they have bred in this country. This and an allied species are beautifully figured by Mr. Gould, in his 'Birds of Australia.' The wing-coverts are remarkable for a large ovate spot of metallic lustre, changing in different lights.

1712.—The Talpicoti

(*Chamæpelia Talpicoti*). Brazil, Paraguay, and other portions of South America are the native countries of this little pigeon. It frequents the borders of woods, associating in families of four or six, but never in large flocks: these perch on low bushes and underwood, at a little distance from the ground, to which indeed they constantly resort; they are often to be seen near houses in the country and farmyards, and, when captured, speedily become reconciled to the limits of an aviary, and breed freely. Their nest is mostly placed in some bush; never on the branches of tall trees. Berries and grain constitute their food. Length six inches and a quarter. Top of head and back of neck grey; cheeks and throat pinkish white; plumage above brownish orange, with black marks on some of the wing-coverts; under plumage deep vivacious red; tail brownish black, the two middle feathers being brownish orange.

1713.—The B-rownbacked Peristera

(*Peristera tympanistria*). This species is a native of Southern Africa, where it is said to frequent woods; but little appears to be known respecting it. The plumage above is brown, slightly tinged with grey on the neck; three or four of the greater wing-coverts have large spots of shining green; forehead, a streak over each eye, and all the under parts white; middle tail-feathers brown, the two exterior on each side grey, with a broad black bar near the tip; under surface of wings and sides pale orange-brown; under tail-coverts brown; bill and legs grey, the latter tinged with reddish; length nine inches.

1714.—The Wattled Ground-Pigeon

(*Geophilus caruncutatus*). To the group to which this bird belongs Le Vaillant has given the title of Columbi-gallines, in allusion to its approach in many particulars to the gallinaceous birds (the fowl tribe). It would appear that these birds are almost entirely, if not altogether, terrestrial; the tarsi are long; the tail is short; the wings concave and rounded; the body thick and heavy. Instead of laying only two eggs, the females are reported to lay eight or ten, which are incubated in the ground; and the young, like those of the partridge, almost immediately follow the parent, who broods over them, and gathers them beneath her wings. They walk and run with great rapidity; and roost on bushes or the lower branches of trees.

The present species is a native of South Africa, and was discovered by Le Vaillant in the Namaqua country. We learn from him that the nest is composed of twigs and the dried stems of grasses, and placed in some slight hollow of the ground, and there the female lays six or eight reddish-white eggs, which are incubated by both the parents. The young are hatched clothed with down of a reddish grey, run immediately, and follow their parents, which keep them together by a peculiar oft-repeated cry, and brood over them with their wings. Their first food consists of the larvæ of ants, dead insects, and worms, which the parents point out to them. When strong enough to find their own food, they live on grain of different sorts, berries, insects, &c., and keep together in coveys like the partridge and other Tetraonidæ till the pairing-time. Size about that of the Common Turtle, but with the body stouter and more rounded. Base of the bill and forehead covered with a naked red wattle; another wattle of the same hue depends from the chin, and branches of it extend upwards towards the ears. Plumage of head, cheeks, neck, and breast purplish grey; back, scapulars, and wing-coverts pale grey; feathers bordered with white. Belly, upper and under tail-coverts, flanks, and under wing-coverts white. Tail short, rounded, deep ruddy brown, except the outer feather on each side; these have the outer web white. Legs covered with hexagonal scales, purplish red. Iris with a double circle, yellow and red. The female has no wattle, and her colours are less pure. (Le Vaillant.)

1715.—The Nicobar Pigeon

(*Goüra Nicobarica*, Temm.). This splendid bird, of which we have seen living specimens in the Gardens of the Zoological Society, is a native of Java, Nicobar, Sumatra, and many of the Moluccas. It is, as far as we have been enabled to determine, terrestrial in its habits. Its plumage is very refulgent; the head is of a dull slate colour, with a tinge of purple; the neck is ornamented with long flowing pointed feathers like the hackles of the domestic cock, of a rich green with coppery reflexions: the coverts of the wings are also pointed. The whole of the upper surface is burnished with bronze and steel-blue reflexions on glossy green; the under surface is the same, but not quite so brilliant; the tail, which is very short and square, is pure white. A fleshy tubercle rises on the base of the upper mandible in the breeding season. Length about fourteen inches.

1716, 1717.—The Crowned Pigeon

(*Lophyrus coronatus*). This remarkable bird is decidedly the type of a distinct group among the pigeons, to which family one would hardly at first sight conceive it to belong. Its limbs are like those of a fowl, and so are the wings, and the head is surmounted by a flat fan-like crest of slender feathers with loose barbs. In size it exceeds a large fowl, measuring in total length twenty-eight inches. It is a native of Java, Banda, New Guinea, and the Moluccas. Of this magnificent species living specimens have been kept in the menagerie of the Zoological Society. In its manners it resembles poultry, and walks about with firm and stately steps, and with its beautiful crest expanded. In India and the islands it is sometimes kept tame in the court-yards among other poultry; and Sir George Staunton, in his 'Embassy to China,' notices it under the title of Crown Bird, and states that it is very familiar. Its voice, though plaintive, is loud and sonorous, and the cooing of the male is said to be accompanied by a noise somewhat like the "gobble" of a turkey-cock.

This heavy terrestrial bird is stated to build a nest in trees, the eggs being two in number. Its food consists of grain and berries, and its flesh is reported to be excellent. General colour deep slate blue, with a patch of maroon and white on the wing; quills and tail blackish ash, the latter paler at the tip. Mr. Selby regards the Crowned Pigeon as related to the Curassows.

ORDER RASORES.

The characters of this order are very clear and definite, and at once separate between it and every other into which the feathered race is divided.

The birds composing it are all granivorous, feeding upon the produce of the various cerealia, grasses, &c., to which may be added roots, berries, and also insects and their larvæ; the limbs are formed for terrestrial habits, and the hind-toe, as a rule, is placed higher upon the tarsus than the plane of the anterior toes. The wings are mostly rounded, concave, and unfit for rapid or long continued flight, though to this rule some few species afford exceptions. Formed for the ground, these birds walk well, and run with considerable rapidity; the limbs are muscular; the body is stout and heavy; the beak strong and horny, and at its base there is a tough membrane, in which the nostrils are situated. Most are polygamous, and the females lay several eggs. The young are hatched in a state of considerable forwardness, and follow the mother, who broods over them with her wings, and leads them in search of food (grains and insects), which they themselves pick up. Many roost in trees: others on the ground exclusively. It is to this order that most of our domestic birds, the feathered tenants of the farm-yard, belong: and also most of those unreclaimed by man, celebrated for the excellency of their flesh, as the grouse, partridge, quail, and pheasant. The breast-bone is very narrow, with a deep short keel, and at each side posteriorly is a deep and extensive notch, or indenture, besides which are two extensive lateral processes. The merrythought is feeble.

1718.—A Group of Domestic Poultry

or Rasorial birds (Gallinaceous), constituting the family Phasianidæ of Vigors.—*a*, the Peacock; *b*, the Turkey; *c*, Cock and Hen of the Dorking breed; *d*, Guinea-fowl; *e*, Cock of the Hamburg breed; *f*, Game Cock and Hen; *g*, Bantam Cock and Hen.

Of this group we shall commence with the common fowl (Gallus domesticus, Ray). Of all our domestic birds, the common fowl appears to have been the longest reclaimed. and is the most extensively spread. It has ramified into numerous varieties, a circumstance which attests not only the antiquity, but the completeness of its subjugation This bird is of Indian origin; the wild stock whence it has descended is, probably, the Bankiva jungle-fowl, which interbreeds freely with the common domestic race, and has been crossed with some of the game breeds for the purpose of keeping up the spirit and vigour of the stock.

The circumstances attendant upon the primeval domestication and spread of the common fowl are buried in obscurity, nor know we at what period it became naturalized in our island. Its introduction, however, must have been at a remote epoch, as we find it among the things prohibited by the Druids as food. Allusions to the common fowl are abundant in the earliest writings, and we know that the ancient Greeks, on whose medals its figure is often seen, valued it for its pugnacious disposition and its prowess. Cock-fighting was one of their diversions, and the breeds most in repute were those of Rhodes and Tanagra in Bœotia. Distinguished breeds were found also in Eubœa, Media, and Persia, as well as in Egypt.

The Romans, whose taste for sanguinary spectacles is notorious, were extremely partial to the amusement of cock-fighting, and trained birds for the purpose. Indeed the taste for this cruel sport seems to be very general: the Mussulman natives of India are greatly addicted to it, and one species of jungle-fowl, called Sonnerat's jungle-fowl (Gallus Sonneratii), is in high request; this bird, though smaller than the domestic breed, is superior in spirit and endurance, and usually proves victorious in the combat. The Chinese are devoted to the sport; and the natives of Sumatra enter into it with so much ardour, that instances, as it is said, have occurred of men staking not only their goods and money, but even their children on the issue of a battle.

In England the same taste long prevailed, but happily the practice, more honoured in the breach than the observance, is now greatly on the decline, if not obsolete; it is indeed incompatible with the diffusion of knowledge, the tendency of which is to humanise mankind, and lead the mind from sordid and debasing pursuits to sources of intellectual enjoyment. The common fowl is a hardy bird, and capable of enduring considerable severity of cold; hence its extensive distribution in a domestic state. The warmer and temperate latitudes, however, are most congenial to it; in the high northern regions it cannot be kept without difficulty, and therefore is not general in the bleak realms of Siberia; indeed it is found not to breed.

Besides the game race, which approaches the nearest in character to the wild stock, several varieties exist in our island. One, the Friesland, has the feathers curled back, the plumage having a ruffled and by no means agreeable appearance. Another breed, the Rumpless, or Persian, Fig. 1719, is destitute not only of tail-feathers, but also of the tail itself. Some breeds have the comb greatly developed, in others it is small, and its place is usurped by a tuft of feathers. Dorking is celebrated for a large and delicately flavoured variety, distinguished by having five toes on each leg, the hind-toe being doubled. The Poland (of which there are the gold and silver spangled), the black Spanish, and the Hamburg breeds are also excellent. A small breed of fowls, termed the Bantam, (originally from Java), is very beautiful. The old Bantam fowls, which are not much larger than a partridge, are feathered to the toes, the tarsi having long stiff feathers down them; there is a small variety, however, with clean legs and an elegantly spangled plumage, much in request. It was brought to perfection by Sir John Sebright. The tail of the cock is simply folded like that of the hen, without the usual recurved drooping feathers. This beautiful bird is very spirited.

Besides these is the silk fowl from Japan and China, which is white, with the feathers decomposed and silky to the sight and touch. The comb and wattles are purple-lake, and the periosteum (thin membrane covering the bones) is dark. There is in India a small variety (Gallus Morio, Temm.) which has also the periosteum black, and the comb, wattles, and skin dull purple. A gentleman who had this breed near London presented us with a chicken for the table; its flesh was excellent.

One of the most remarkable of the domestic breeds is that known in India by the name of the Kulm fowl, of which the males stand upwards of twenty-six inches in height. Some are inclined to regard this as specifically distinct from the ordinary race;

it is the Gallus giganteus of Temminck. In India it is known only as a domestic bird, but Colonel Sykes states that he has reasons for believing it to have been introduced there by the Mussulmans from Sumatra or Java. The iris of the real game bird should be whitish or straw-yellow. Colonel Sykes landed two cocks and a hen in England in June, 1831: they bore the winter well; the hen laid freely, and has reared two broods of chickens. The cock has not the shrill clear crow of the ordinary breed. The hen is a third smaller than the male. The cock has a method of resting, when tired, on the whole of the tarsus laid flat on the ground, and very ungainly the mode appears. See 'Proceeds. Zool. Soc.' 1832, p. 151. The comb of this bird is compressed, thick, but little elevated, and with a smooth instead of a serrated ridge; the wattles are small, and the throat is naked.

All have heard of the Eccaleobion, or apparatus for hatching chickens by the heat of steam, lately exhibited in London. The practice of hatching broods by the application of artificial heat is not novel; it has been in operation in Egypt from a very early period. The eggs are placed by hundreds in ovens, or rather small chambers, the temperature of which is regulated with great nicety at a degree of about ninety-six Fahrenheit. At the time of hatching people come from all quarters to purchase the young chickens, which require but little trouble in rearing. We extract the following account from the 'Library of Entertaining Knowledge—Habits of Birds:'—

"Modern travellers, who mention the art as practised in Egypt, are very deficient in their details; but we ought to wonder the less at this when Father Sicard informs us that it is kept a secret even in Egypt, and is only known to the inhabitants of the village of Berme, and a few adjoining places in the Delta, who leave it as an heirloom to their children, forbidding them to impart it to strangers. When the beginning of autumn, the season most favourable for hatching, approaches, the people of this village disperse themselves over the country, each taking the management of a number of eggs intrusted to his care by those acquainted with the art.

"According to the best descriptions of the Egyptian mamal, or hatching oven, it is a brick structure about nine feet high. The middle is formed into a gallery about three feet wide and eight feet high, extending from one end of the building to the other. This gallery forms the entrance to the oven, and commands its whole extent, facilitating the various operations indispensable for keeping the eggs at the proper degree of warmth. On each side of this gallery there is a double row of rooms, every room on the ground-floor having one over it of precisely the same dimensions, namely, three feet in height, four or five in breadth, and twelve or fifteen in length. These have a round hole for an entrance of about a foot and a half in diameter, wide enough for a man to creep through; and into each are put four or five thousand eggs. The number of rooms in one mamal varies from three to twelve; and the building is adapted, of course, for hatching from forty to eighty thousand eggs, which are not laid on the bare brick floor of the oven, but upon a mat, or bed of flax, or other non-conducting material.

"In each of the upper rooms is a fire-place for warming the lower room, the heat being communicated through a large hole in the centre. The fire-place is a sort of gutter, two inches deep and six wide, on the edge of the floor, sometimes all round, but for the most part only on two of its sides. As wood or charcoal would make too quick a fire, they burn the dung of cows or camels, mixed with straw, formed into cakes and dried. The doors which open into the gallery serve for chimneys to let out the smoke, which finally escapes through openings in the arch of the gallery itself. The fire in the gutters is only kept up, according to some, for an hour in the morning and an hour at night, which they call the dinner and supper of the chickens; while others say it is lighted four times a-day. The difference probably depends on the temperature of the weather. When the smoke of the fires has subsided, the openings into the gallery from the several rooms are carefully stuffed with bundles of coarse tow, by which the heat is more effectually confined than it could be by a wooden door.

"When the fires have been continued for an indefinite number of days—eight, ten, or twelve, according to the weather—they are discontinued, the heat acquired by the ovens being then sufficient to finish the hatching, which requires in all twenty-one days, the same time as when eggs are naturally hatched by a hen. About the middle of this period a number of the eggs in the lower are moved into the upper rooms, in order to give the embryos greater facility in making their exit from the shell, than they would have if a number of eggs were piled up above them.

"The number of ovens dispersed in the several districts of Egypt has been estimated at 386; and this number can never be either increased or diminished without the circumstance being known, as it is indispensable for each mamal to be managed by a Bermean, none of whom are permitted to practise their art without a certified licence from the Aga of Berme, who receives ten crowns for each licence. If then we take into account that six or eight broods are annually hatched in each oven, and that each brood consists of from forty thousand to eighty thousand, we may conclude that the gross number of chickens which are every year hatched in Egypt amounts to nearly one hundred millions. They lay their account with losing about a third of all the eggs put into the ovens. The Bermean, indeed, guarantees only two-thirds of the eggs with which he is intrusted by the undertaker, so that out of forty-five thousand eggs he is obliged to return no more than thirty thousand chickens. If he succeeds in hatching these, the overplus becomes his perquisite, which he adds to the sum of thirty or forty crowns, besides his board, that is paid him for his six months' work."

Fig. 1720 represents an Egyptian egg-oven. Fig. 1721, the ground-plan of the same. Fig. 1722, transverse section and elevation. Fig. 1723, transverse section and perspective elevation.

Réaumur tried many experiments on the artificial modes of hatching eggs; he first attempted to bring the chicks to maturity by placing the eggs in hotbeds of manure—but the attempt failed. He then put the eggs into a sort of frame (Fig. 1724) composed of a series of open boxes, and put them into a stable heated by manure, but without success; the vapour evidently destroyed their vitality—they became moist as if they had been dipped into noisome water; and putrefaction ensued. He next enclosed the eggs in casks, sunk in the bed of manure; but raised about three inches above the surface of the bed, as seen at Fig. 1725, and to the delight of himself and his gardener, who took great interest in the proceedings, was eminently successful.

In consequence of these results, the rector of St. Sulpice felt a desire to extend the practice, and applied to M. Réaumur for instructions, but instead of recommending hotbeds of manure, the naturalist imagined that he might take advantage of the heat of the bread-ovens belonging to the extensive benevolent Institution called L'Enfant Jésus. "After several trials to ascertain the heat of a room which was situated over this bake-house, and such arrangements as were necessary for ensuring uniformity, it was determined to place the eggs in order upon the shelves of a small cupboard placed there, and intrust the care of them to the nuns of the establishment. In one of the first experiments made here the charge of keeping a single box containing a hundred eggs was intrusted to a very ingenious nun who was quite enthusiastic in the business. Above half of these eggs proved abortive, but it was worthy of remark that about twenty were hatched about one day sooner than they would have been under a hen. When the first of them appeared, the nun was transported with joy, and directly ran to tell the news to everybody she could find."

Fig. 1726 shows the hatching-room over the bake-house of the Priory of L'Enfant Jésus at Paris.

In the case of artificial hatching it is evident that under ordinary circumstances some plan must be adopted to supply the place of the careful fostering hen. It is to the backs of chickens that the warmth of the hen is chiefly applied, as they huddle under her body and wings; keeping this fact in view, M. Réaumur constructed what he termed artificial mothers, of which the most simple is merely a box lined with sheepskin with the wool on it, of a square form with the top sloped like a writing-desk, in order to accommodate chickens of various sizes (Fig. 1727); this was open at each end, and placed in an enclosure of wire or netting. Fig. 1728 shows an improvement on the preceding, in which the fostering place is continued from a cage for exercise and feeding, and furnished with moveable covers, capable of being regulated according to the growth of the chickens, but always so low as to prevent them from climbing over each other. Fig. 1729 represents a still more ingenious apparatus, consisting of a stove, with an apartment round it for the young brood, and a network both to prevent their escape and too near approach to the stove. Of the heat of this stove M. Réaumur took advantage to hatch fresh broods by hanging eggs in baskets over it, nicely adjusting the temperature. A similar apparatus (Fig. 1730) he applied to water-fowls, as ducks, &c., surrounding it with green turf, and adding a small pond to the feeding-room.

With respect to the habits of our domestic fowls nothing need be said. The crow of the cock, the cackle of the hen, the care of chanticleer over his harem, his attention and spirit, the cluck with which he calls the females to some acceptable food, their mode of dusting their feathers, their habit of swallowing gravel and small pebbles, to assist in the trituration of grain, subjected to the action of the muscular gizzard, these and many other points in their economy are known to all. From the domestic fowl we shall advance to some of the wild breeds

1731.—The Bankiva Jungle-Fowl

(*Gallus Bankiva*, Temm.). The Javan cock of Latham; Ayam utan of the Malays.

This beautiful species is a native of Java, and, though smaller in size, closely resembles the black-breasted red game breed of our own country. It tenants the jungles, and in some districts is very abundant. We have seen many specimens in the Gardens of the Zoological Society. A larger variety or perhaps a distinct species is found on the continent of India. The plumage of the male is as follows:—the hackles of the neck and rump are long, and of a fine rich orange red; the upper part of the back below the hackles bluish black; the shoulders bright chestnut red; the greater coverts and secondaries deep steel-blue; the quills brownish black, edged with pale reddish yellow; tail black, with green and steel-blue reflexions; breast and under parts black; the comb, which is upright and deeply indented, the naked space round the eyes, and the wattles scarlet. The hen closely resembles a brown game hen, of the same breed as the black-breasted red, or duck-winged game cock.

That this wild fowl, or the larger continental species allied to it, is the origin of our domestic race (and especially the game breed referred to) we have no doubt. It is at the same time very probable that other species are commingled with it, our domestic breed being of mixed origin, the game race the purest. Should such be the case, the theory of the non-fertility of the produce of two distinct species, as a strict rule, falls to the ground. The Javan jungle-fowl, and we believe Sonnerat's jungle-fowl, will breed with the ordinary race, and the progeny rapidly multiplies. Besides the present species, we may notice the Bronzed Jungle-fowl (Gallus Æneus), and the Fork-tailed Jungle-fowl (Gallus furcatus, Temminck), as natives of Java and Sumatra. The former, which was discovered in the interior of Sumatra by M. Diard, is larger than the Bankiva cock; the edge of the comb is smooth; and the feathers of the neck and rump, though elongated, are not true hackles. The latter, a native of Java, has also the comb entire, and is destitute of true hackles, but instead of double wattles it has only one, of large size, pendent from the middle line of the throat.

1732, 1733, 1734.—Sonnerat's Jungle-Fowl (male and female)

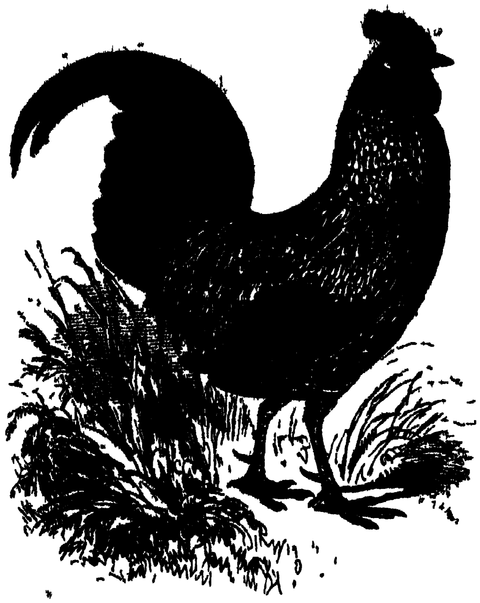
(*Gallus Sonneratii*). Jungle-fowl of the sportsmen in India; Rahn Komrah of the Mahrattas.

This splendid bird, of which many specimens have lived long in the menagerie of the Zool. Soc., is celebrated for its high courage and prowess, and is in great request among the cock-fighters of Hindostan, who consider it more than a match for a larger bird of the ordinary breed. Its port is erect and stately, and its form is admirable. In size this species is nearly equal to the domestic fowl, but is lighter and more graceful. The comb is only slightly indented; the wattles are large and double; the hackles (though they scarcely come under this term) of the neck, of the wing and tail-coverts dark greyish, with bright golden orange shafts dilating in the centre and towards the tip into a flat horny plate. In some of these feathers the shaft takes an elliptical or oar-like shape; in others it puts on the appearance of a long inverted cone, from the centre of the base of which a battledore-like process arises. The substance and appearance of these plates have been not inaptly compared with the wax-like plates which ornament the wings and tail of the Bohemian Chatterer. The effect produced by this modification of the shafts is singular and beautiful. Feathers of the middle of the back, breast, belly, and thighs deep rich grey, with paler shafts and edges; tail generally rich deep green; the feathers which immediately succeed the hackles are rich purple, with a pale yellow edge; those next in succession are golden-green, with grey edges, and all are glossed with brilliant metallic reflexions; bill, legs, and feet yellow. The living bird presents altogether a rich and striking object, especially when the sun shines on the plumage.

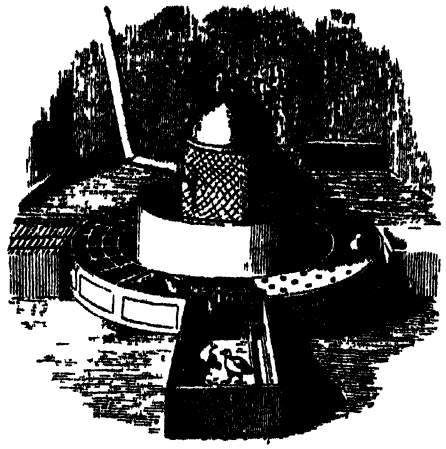
Female less than the cock by about a third, without comb or wattles, but a trace of nakedness round the eye. The plumage (generally) is without the horny structure which distinguishes that of the male. Upper parts uniform brown; neck feathers with dark edges, those of the back and wing-coverts with a pale streak along the shaft, and those of the wings, tail-coverts, and tail waved and mottled with darker pencillings; throat and front of the neck white; feathers of the rest of the lower parts greyish white, edged with dark brown; legs and feet bluish grey.

1735, 1736.—The Fire-backed Jungle-Fowl

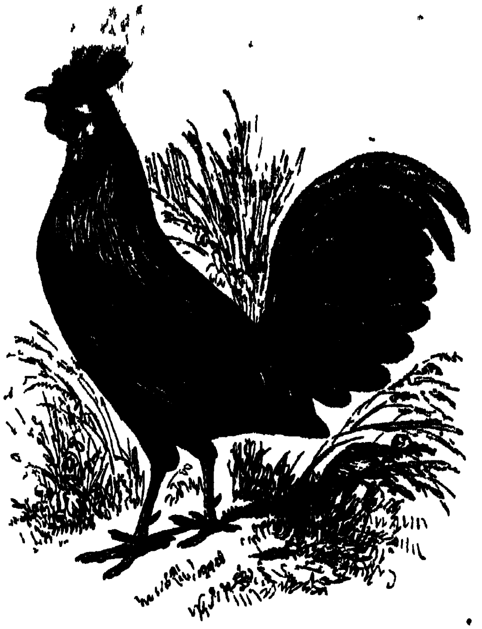
(*Euplocamus ignitus*, Temm.). Fire-backed Pheasant; Macartney cock; Phasianus ignitus.



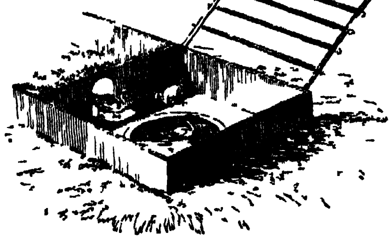
1732.—Sonnerat's Jungle-Fowl. Male



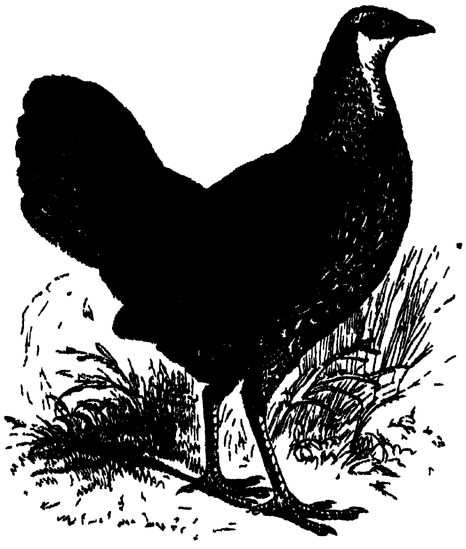
1799.—Reaumur's Stove and Hatching-Floor.



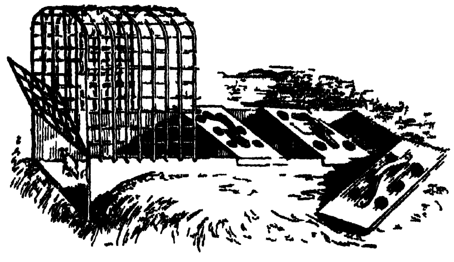
1731.—Bankiva Jungle-Fowl



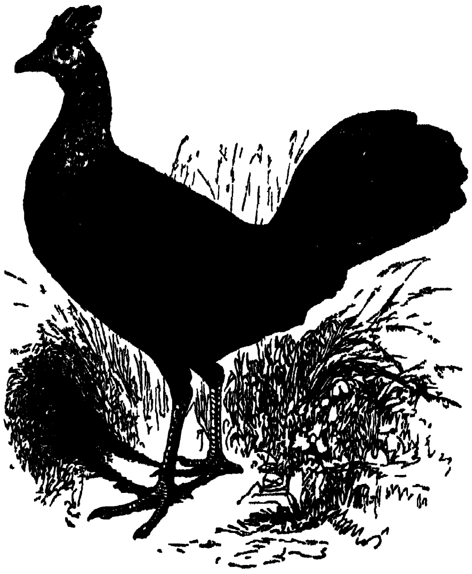
1730.—Artificial Mother for Water-fowl



1733.—Sonnerat's Jungle Fowl. Female

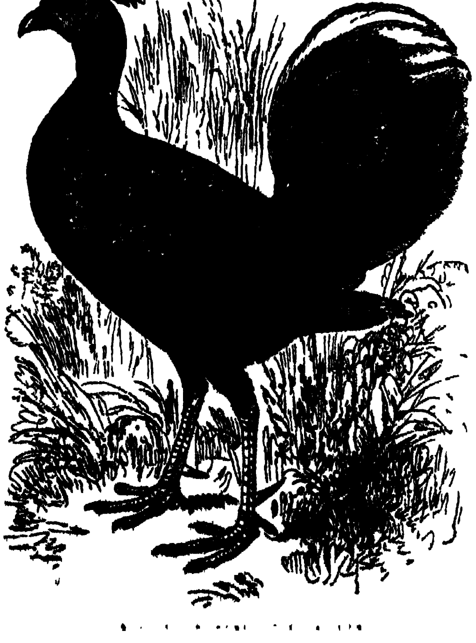


1728.—Improved Artificial Mother

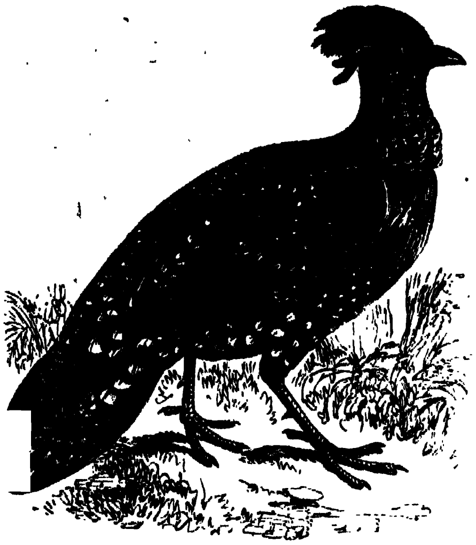


1736.—Fire-backed Jungle-Fowl. Female

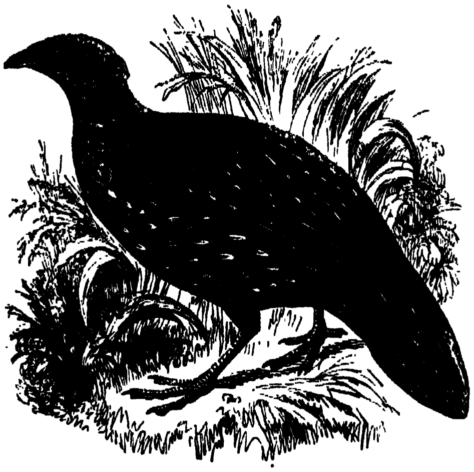
[illegible]



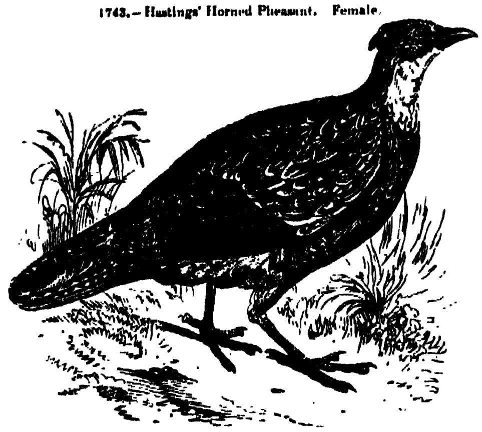
[illegible]



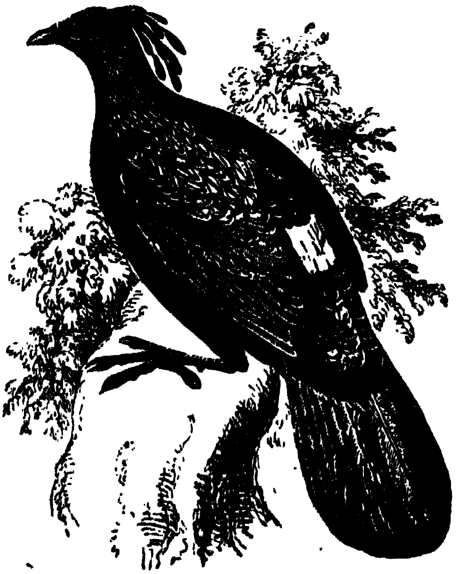
1742.—Hastings' Horned Pheasant. Male



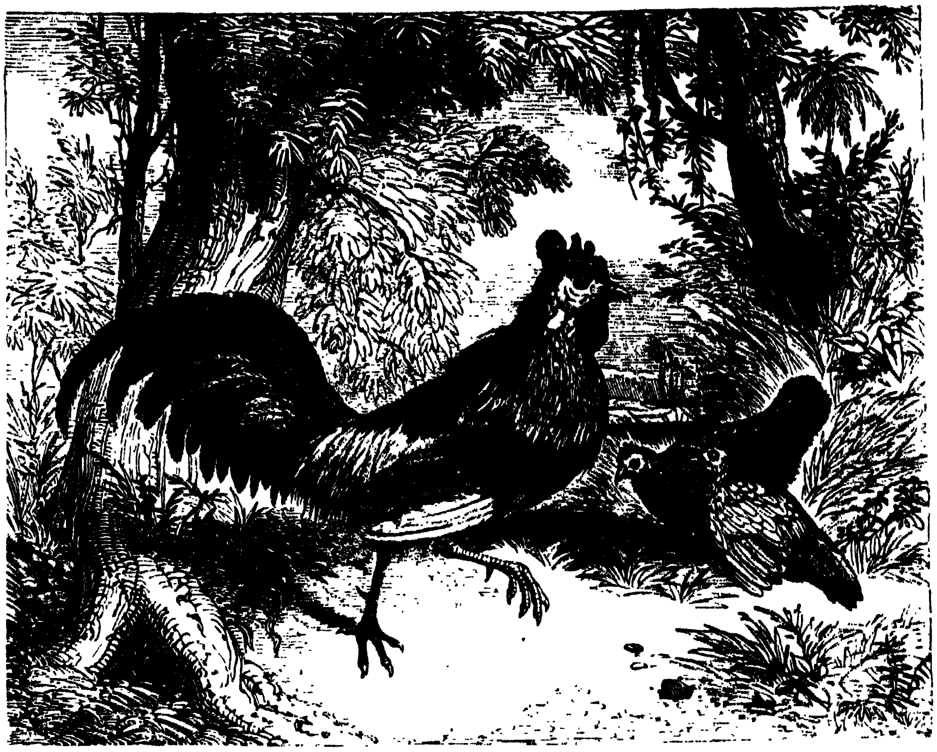
1743.—Hastings' Horned Pheasant. Female.



1739.—Impeyan Pheasant. Female.

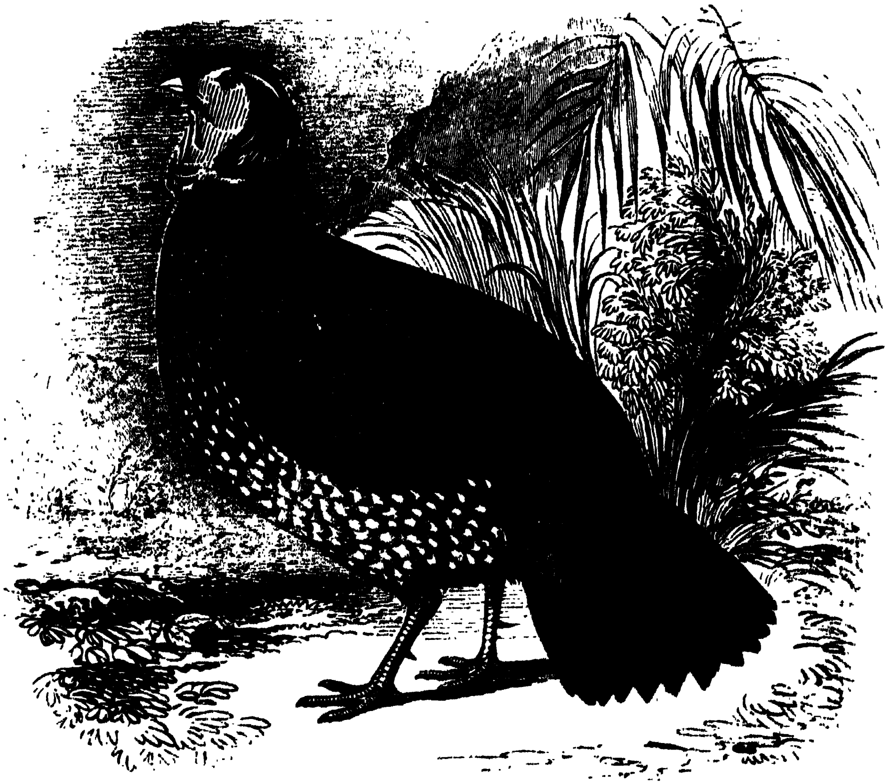


1738.—Impeyan Pheasant. Male.



1734.—Jungle-Fowl of India.

740.—Head of Impeyan Pheasant.



1741.—Temminck's Horned Pheasant.

The noble species which is intermediate between the true jungle-fowls and the pheasants is larger than the domestic game breed, and stands peculiarly high on the legs, which are strong, and in the male armed with sharp spurs; there are no long hackle-feathers on the neck; and the head, adorned with a crest of naked shafted feathers expanded at their tips into slender spreading barbs, is destitute both of comb and wattles. The sides of the head, from the base of the beak to the occiput, are covered with a naked purplish skin, encircling the eyes: the general plumage is black, shot with gleaming steel-blue; the lower part of the back is rich orange red or flame-colour, and this colour extends zone-like round the body, but becomes obscure on the abdomen; tail-coverts broad, of a rich glossy bluish green, with a paler bar at the tip; the four middle tail-feathers, and the two central bending ones (which are really developed tail-coverts in the males of the fowl tribe), are white, the rest black with green reflexions.

The female, Fig. 1736, has her plumage of a rich cinnamon brown, the feathers of the upper parts being slightly mottled with black; the throat is white, and the feathers of the under parts, which are paler than those of the back, are edged with white; head crested; tail folded as in the fowl.

This species is a native of Sumatra, and was first introduced to science by Sir George Staunton, in the narrative of his 'Embassy to China.' His host at Batavia, among other interesting specimens of natural history, possessed one of this bird, which was presented to Sir G. Staunton; it was sent to England and described by Shaw. As its tail was mutilated, the figure (No. 13, Atlas to the work of Sir G. Staunton) is so managed as to leave the form of the tail undetermined. Fine specimens are in the Museum of the Zool. Soc. The bending feathers of the tail are shorter and much broader than those of the jungle-cocks G. Bankiva and G. Sonneratii, or of the ordinary domestic cock.

Advancing to the true pheasants, we may observe that they differ in many points from the jungle-fowls (Gallus). The head is destitute of a comb, the tail is long, more or less drooping, and composed of long gently arching feathers, of which the middle exceed the rest; the legs of the male are armed with spurs. The pheasant has little in his port of the upright gallant bearing of the jungle-cock, or game cock; his attitude is more crouching, and the whole figure lower and more elongated. The common pheasant (Phasianus Colchicus) is too well known to require description. It is naturalized in our country and throughout a great portion of the European continent, but is originally from Mingrelia and Georgia, anciently Colchis. It is said to be common in Tartary and some parts of China. Its introduction into Europe was ascribed by the ancients to Jason, who conducted the Argonautic expedition to Colchis (B.C. 937, Newton; B.C. 1263, Blair). Be this as it may, the Greek name of the bird φασιανὸς (Latinized Phasianus), and the origin of its modern European names, indicates the banks of the river Phasis (the present Faz or Rion) as the locality whence the Greeks first derived it. Pliny calls these birds Phasianæ aves—birds of the Phasis.

Besides the common pheasant we have a variety, by some regarded as a distinct species, called the Ring-necked pheasant, distinguished chiefly by a white ring round the neck. It intermingles with the common sort.

The pheasant breeds in April, the young being hatched at the latter end of May, or the beginning of June. The nest is a rude structure placed on the ground under the covert of fern; the eggs are from ten to fourteen in number.

The food of this bird is very miscellaneous; Jerusalem artichokes, potatoes, buckwheat, beans, peas, barley, and wheat, are favourite articles of diet; so also are bulbous roots, as those of the tulip, the buttercup, &c. For these the bird digs with its bill and feet. To this list must be added wild berries, sloes, haws, &c., and also insects, the larvæ of ants, &c. Hybrids between the pheasant and barn-door fowl are not uncommon. These hybrids, though they will not, as it would appear, breed together, will breed either with the pheasant or common fowl. (See 'Proceeds. Zool. Soc.' 1836, p. 84.)

Female pheasants, and also common fowls, occasionally assume the plumage and voice of the male. In these instances a peculiar disease renders the birds unproductive. To enter minutely into the habits and manners of the pheasant is not necessary.

Fig. 1737 represents a group of three pheasants remarkable for their beauty, natives of China.

1737, *c.*—Reeves' Pheasant

(*Syrmaticus veneratus*, Wagler). Phasianus veneratus, Temminck; Ph. Reevesii, Hardwick. This splendid bird is a native of the north of China, and the snowy mountains of Surinagur; but no living example ever reached Europe until the one brought over by J. Reeves, Esq., of Canton, in 1831, and presented to the Zoological Society. In 1834 a second specimen was procured by the same gentleman, and sent to the Society's menagerie. This species is remarkable for the length of its tail, and especially of the two middle tail-feathers, which when fully grown measure six or seven feet in length; they are beautifully barred with curved bands of dark brown on a grey ground, the bands passing into pale chestnut at the edges. In size the bird exceeds the common pheasant. Fine specimens of the present species are in the British Museum. In its manners the Reeves' pheasant closely resembles the common pheasant, as far as can be judged by the actions of the living specimens alluded to, and we doubt not it might become naturalized in our country. Upper surface generally golden yellow, each feather having a distinct margin of black; the head white, naked space round the eye scarlet; and a black streak passes over the ear-coverts to the back of the head; throat white, bounded by a gorget of black; the feathers of the sides white in the centre, with barb-shaped marks of black, and a deep red-brown border; under parts black.

1737, *b.*—The Golden Pheasant

(*Thaumalea picta*, Wagler). Phasianus pictus, Linn. This richly coloured species is common in aviaries, where it breeds freely; it is a native of China, where, according to Latham, it is called Kenki, or Kenkee, which signifies gold-flower fowl; and is a great favourite, as may be readily supposed, from its beauty. The head is ornamented with a silky crest of fine amber yellow. The feathers of the back of the head and neck are square, disposed in scales, and of a rich orange red, edged with a line of black, and capable of being raised up at will; lower down, so as to encroach upon the top of the back, is a space of dark glossy greenish feathers with rounded edge, disposed scale-like; the back is rich yellow, as are the upper tail-coverts, with a crimson border; the tail-feathers are mottled with chestnut and black; the wings are deep blue at their base; quills and secondaries brown with chestnut bars; the whole of the under surface intense scarlet. The female is of a uniform rusty brown, with darker marks and spots, and the tail is comparatively short. We have seen admirable Chinese paintings of this bird.

1737, *a.*—The Silver Pheasant

(*Gennæus nycthemerus*, Wagler). Phasianus nycthemerus, Linn. This is a larger and hardier bird than the golden pheasant, and, though less gorgeous, quite as beautiful from the chasteness of the colouring and delicacy of the pencillings. It is a native of the north of China, and in our island thrives so well that its naturalization can be a work of no great difficulty. It is as tame in confinement as a barn-door fowl, and has more the habits and manners of the fowl than of the pheasant. The cheeks are covered with a naked skin of intense scarlet; a crest of black feathers ornaments the top of the head; the upper surface generally is of a pure white, traversed with the greatest regularity by finely pencilled lines of black across the feathers; the chest and under surface are purplish black. In the female the plumage of the upper surface is rusty brown; of the under parts dingy white, banded with blackish, and irregularly clouded with brown.

1738, 1739.—The Impeyan Pheasant

(*Lophophorus Impeyanus*). Lophophorus refulgens, Temminck. The genus Lophophorus is characterized as follows:—Head surmounted by a plume of feathers having long slender shafts, and spreading into a spatulate form at the extremities; the cheeks are only partially clothed with feathers; the tail is broad and rounded at the termination; the tarsi in the male are armed with spurs; the tip of the upper mandible of the beak is prolonged and dilated for scooping: the plumage of the male is of metallic brilliancy. Fig. 1740 represents the head of the male. The Impeyan pheasant is a native of the Himalaya Mountains, and is never found on the plains; hence it exists in a temperature even below that of moderate. The form is robust, and its food consists to a great extent of bulbous roots, which it rakes up with its bill out of the ground, for which purpose, as well as for detaching the concentric layers composing this substance, the upper mandible is well adapted. In the male the head and throat glisten with metallic green: the feathers of the lower part of the neck and top of the back are lancet-shaped, and of an intense metallic purple. The wings and general plumage are steel blue, with a white band across the lower part of the back; the tail is rufous brown. As is the rule among the gallinaceous birds generally, and especially the pheasant tribe, the pea-fowls, and turkeys, the female (Fig. 1739) is not only smaller than her mate, but differs greatly in colour, being of a dull brown, dashed with grey and yellowish, and having a white throat The crest is comparatively trifling. Cuvier considers the present genus as allied in some degree to the pea-fowls.

1741.—Temminck's Horned Pheasant

(*Tragopan Temminckii*, Gray). To this bird we shall allude in our observations on the next species.

1742, 1743.—Hastings' Horned Pheasant

(*Tragopan Hastingsii*). The species composing the genus Tragopan of Cuvier, which seem to offer an intermediate link between the genuine pheasants and turkeys, are easily distinguishable from all the rest of the Phasianidæ (at least as far as regards the male birds) by the presence of large throat-wattles, or naked carunculated flaps of skin (resembling those of the turkey), which extend from the naked cheeks, spread over the throat, and proceed down each side of the neck, while from behind each eye rises a soft fleshy horn. The whole of these appendages are capable of being contracted and dilated at pleasure, or in accordance with the emotions of anger, fear, &c., as we see in the male turkey: the tints of the horns and wattles are rich purple, mingled with scarlet, and are most probably changeable from one hue to another. The tail is broad and rounded, and the plumage is dotted with round spots of white on a brown or red ground, the effect of which is very pleasing.

Of the three species that are known at present, two have been but recently introduced to science, nor, indeed, is our acquaintance with the one first described of distant date. The first species is the horned pheasant of Nepâl (Tragopan satyrus). It was first described and figured by Edwards, in the third volume of his 'Natural History of Birds,' p. 116, partly from a drawing sent from India to Dr. Mead, and partly from a head of the bird preserved in spirits which accompanied the drawing. Edwards' third volume is dated 1750, and his plate was etched in 1749, as appears by the date inscribed in the corner. The alliance of this bird to the turkey was not unobserved by this writer, who in his catalogue places it among that group, while in his account of it he observes that it is, "for shape of body and proportion of parts, pretty much like a turkey, and may be ranged with fowls of the poultry kind." Dr. Latham, in his 'General History of Birds,' states that these birds, though by no means common, "are not unfrequent in drawings done in India; and are particularly well figured in those of Mr. Middleton and Lady Impey. . . . . In the drawings of Sir J. Anstruther, it is said to inhabit the snowy regions of Thibet" Its size is between that of a fowl and turkey. It is beautifully figured in Gould's 'Century of Birds.'

The second species is from Thibet and the Chinese borders, and was first described and figured in the 'Indian Zoology,' by Mr. Gray, under the title of Tragopan Temminckii. Of this species, rare as it is beautiful, a living specimen, presented by J. R. Reeves, Esq., was living, in 1836, in the Gardens of the Zoological Society, and, as far as we are aware, was the first example of one of the present group having reached our shores alive and in health. It was procured in China. (Fig. 1741.)

The third species is from the northern range of the Himalaya, and was first illustrated in Mr. Gould's 'Century,' under the name of Tragopan Hastingsii; the figures are those of an adult and young male, and adult female. In size this species rather exceeds the Tragopan satyrus, its total length being twenty-three inches. The head of the adult male is covered with a pendent crest of feathers, which, together with the ear-coverts and the throat, are black; the neck and shoulders are rich maroon; the chest fine orange red; the naked skin round the eyes is scarlet; the wattles and horns purple, tinted here and there with scarlet. The upper parts exhibit a mixture of zigzag lines, and marks of dark and light brown, forming a ground on which are scattered numerous distinct spots of white. The feathers of the under surface are maroon, bordered with black, and having each a large central spot of white. The young male is less brilliant, and the wattles are but little developed.

The plumage of the female consists of a uniform brown, mottled, barred, and dashed irregularly with dark brown and dull fawn colour: the cheeks are clothed with feathers, and the head is slightly crested: there are neither horns nor pendent wattles.

Of the habits and manners of these noble birds in a state of nature little is accurately known.

1744.—The Argus Pheasant

(*Argus giganteus*, Temminck). The genus Argus is thus characterized:—Bill compressed, straight except at the extremity, where it is curved and vaulted: nostrils in the middle of the upper mandible. Sides of head and throat naked; tarsi long and spurless. Tail long, graduated; the two middle tail-feathers far exceeding the rest. Fig. 1745 represents the head. The Argus pheasant is a native of Sumatra, Malacca, and the south-east of Asia.

It is a bird of recluse habits, frequenting wooded hills remote from human abodes. It has never been brought alive to Europe, and is said to pine in captivity. Its voice is reported to be rather plaintive. In size this magnificent bird is little inferior to a peacock. A short hair-like crest rises up on the occiput. The middle tail-feathers on the male often exceed four feet in length. The secondary quill-feathers are remarkable for their elongation and breadth, spreading boldly out at their extremities, and forming, when the wings are opened, a sweeping fan-like plume. Each of these feathers is beautifully ornamented with a row of eyes down the web on the outer side of the shaft, and the rest of this web is filled up with linear and oval marks of a deep brown on a yellowish grey ground. The inner web is white at its edge, but has the remainder filled up with oval spots, as on the outer web. The primary quills are of a fine yellowish grey, with oval dusky spots and blue shafts. The tail-feathers are of a rich brown, thickly dotted with small spots of white. The upper part of the back and the shoulders are pale brown, thickly dotted with round spots of deep brownish black. The lower half of the back and tail-coverts pale buff, thinly spotted with black. The top of the head is ornamented with a crest of short, black, velvety feathers, and the back of the neck with thin, long, hair-like feathers. The female is much less than the male; the back and under surface are brown, with zigzag narrow bars; the lower part of the neck and chest are ferruginous brown, as are also the primary quill-feathers. The secondaries are only slightly elongated, exceeding the primaries by about two inches; they are mottled with buff on a dark brown ground. Tail blackish brown. Top of the head and back of the neck furnished with slender hair-like feathers. No long feathers in the tail, which folds like that of a common hen.

Fig. 1746 gives a faint idea of one of the secondary quill-feathers of the male, which are three times longer than the primaries.

1747.—THE CRESTED PEACOCK-PHEASANT

(*Polyplectron Emphanum*). Eperonnier à toupet, Temminck. Temminck established the genus Polyplectron for the present and a few allied species, remarkable for the splendid ocellations of their plumage. Linnæus and Cuvier referred the species known to the genus Pavo. Generic characters as follows:—Bill moderate, slender, straight, compressed, the base covered with feathers, convex above, where it is rather thick; orbits and part of the cheeks naked; nostrils lateral, placed towards the middle of the bill, and half closed by a membrane. Tarsi long and slender, with two spurs; hind-toe not touching the ground; tail-feathers long and rounded.

The crested peacock-pheasant appears to be a native of Sunda and the Molucca Isles. Of its habits we know nothing. The male is about nineteen inches in length. Forehead and crown ornamented with a crest of long, narrow, loose feathers, which, together with the plumage of the neck and breast, are rich bluish black with metallic reflexions; above the eyes a large pure white shining stripe, and a patch of the same colour upon the ear-feathers; back and rump brown, with irregular paler waved bands; belly and vent deep black; wing-coverts and secondaries brilliant blue, each feather tipped with velvety black. Tail rather long, much rounded, brown, thickly spotted with ochraceous white, and distinguished by large ocellated oval spots of a brilliant metallic green; towards the end of each feather there is a blackish bar: this beautiful and ample tail is supposed not to be erectile, but to be capable of very wide expansion.

1748.—THE THIBET PEACOCK-PHEASANT

(*Polyplectron Thibetanum*). Pavo Thibetanus, Brisson; Chinguis, Buffon; Peacock-pheasant, Edwards; Eperonnier Chinguis, Temminck.

The native region of this species is supposed to be the mountain region which separates Hindostan from Thibet. Living specimens are often kept in the aviaries of the Chinese, and we have seen an excellent Chinese painting of the bird, evidently copied from the life. Mr. Bennett saw two "peacock-pheasants" in Mr. Beale's aviary at Macao, brought, as he states, from Cochin-China. An individual lived for five or six years in an aviary at the Hague, and from that specimen M. Temminck's figure was taken. These birds are said to be very hardy, and, there is but little doubt, might be naturalized in this country. The male is about twenty-two inches in length; there is no crest, but the small greyish brown plumes on the crown of the head are turned forwards, and appear as if ruffled; head, neck, breast, and belly brown, with transverse waved band of blackish brown; throat whitish; back, rump, and tail-coverts clear brown, spotted and waved transversely with greyish white; quills brown, marked with greyish; wings, generally, yellowish grey sprinkled with small blackish brown bands, each feather having at its extremity a large round, ocellated, brilliant blue spot shot with purple and opaline hues; a circle of deep black, which is, in its turn, set in a ring of yellowish white, surrounds each of these iridescent spots; tail-feathers dull brown, sprinkled with small ochraceous spots. Upon each of the twenty-two true tail-feathers, at about an inch and a half from the tip, as well as on those of what has been called the upper range, at about an inch from the tip, two oval spots with purple and blue reflexions with double circles of black and white, like those of the wing, but hardly so brilliant, are separated by the shaft only.

The female differs from the male in having the ocellated spots less brilliant, a shorter tail, and no spurs.

Besides the present species, the P. chalcurum may be noticed: it is of a more sombre hue than the two preceding. Mr. Gray describes two other species, P. Hardwickii and P. lineatum, from General Hardwicke's drawings.

1718, *a*.—THE PEACOCK

(*Pavo cristatus*). Ταὼς or Ταὼν of the Greeks; Pavo of the Latins; Paon, French; Pavon and Pavone, Italian; Pfau, German.

This gorgeous bird, which is too well known in its domesticated state to need description, is a native of India. It is common in many districts, and abounds in the jungles along the banks of the Ganges, in the forests of the Jungleterry and Baughulpore districts, and in the dense woods of the Ghauts. When taken young, it is easily domesticated, and many Hindoo temples in the Dukhun have considerable flocks attached to them. The pea-fowl was known to the ancients. We find it noticed in the Scriptures as being one of the importations from India in the time of Solomon, and a forcible allusion to the splendour of its plumes is made in the Book of Job.

It is generally believed that Alexander the Great obtained this bird during his Indian expedition, and introduced it into Greece, whence it has spread through the greater portion of Europe. But there is good reason to believe that it was well known in Greece at an earlier period; and a talented writer has well observed that it is mentioned in two plays of Aristophanes (third year of 88th Olympiad and second year of 91st, respectively; whereas Alexander was not born till the second year of the 98th Olympiad); and observes it was not improbably introduced before the time of Pericles.

To the Romans it was very familiar; and indeed must have been common in Italy at an early period. Admired as the peacock was, its beauty did not protect it from slaughter, for it was killed to add to the delicacies of the tables of the great and luxurious; and its brain, together with the tongues of flamingoes, entered into the composition of a favourite dish of the Emperor Vitellius.

In our country, a roasted pea-fowl, served up with the plumes attached to it, swelled the rude pomp of a baron's entertainment.

The pea fowl is restless and wandering in its habits, and cannot well be kept in a small space; it perches or roosts by preference on the topmost branches of trees, and indeed is fond of any elevated situation. It seeks its food, however, and also constructs its nest, on the ground. In its wild state it chooses a retired spot, among close brushwood, as the place of incubation, making an inartificial nest of sticks, twigs, and leaves: the eggs are from twelve to fifteen in number. In domestication its habits are the same; indeed domestication has effected but little alteration in these points; nor has it degenerated into numerous varieties. White peacocks, it is true, are sometimes to be seen, and imperfectly coloured birds are not uncommon, but here the changes terminate.

The beautiful plumes of this bird are usually called its tail, and by many are supposed to be so; this, however, is not the case: the plumes of the peacock, which are not developed till the third year, are its tail-coverts; they overhang and conceal the true tail-feathers, which are short, but which may be easily seen when the plumes are elevated.

The Javanese peacock (Pavo Javanicus, Horsfield; Pavo Japonensis, Aldrovand; Japan Peacock, Latham; Pavo spiciferus, Vieillot; Pavo Aldrovandi, Wilson) is a distinct species. It is a native of Java, Sumatra, Malacca, and, as it is said, of Japan.

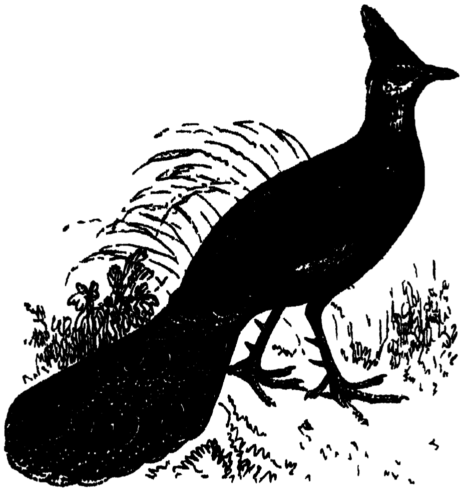
1749, 1750.—THE TURKEY

(*Meleagris Gallopavo*). Coq d'Inde and Dindon (Dinde, fem.), French; Gallo d'India, Gallinaccio (Gallina d'India, fem.) of the Italians; Indianische Hahn of the Germans.

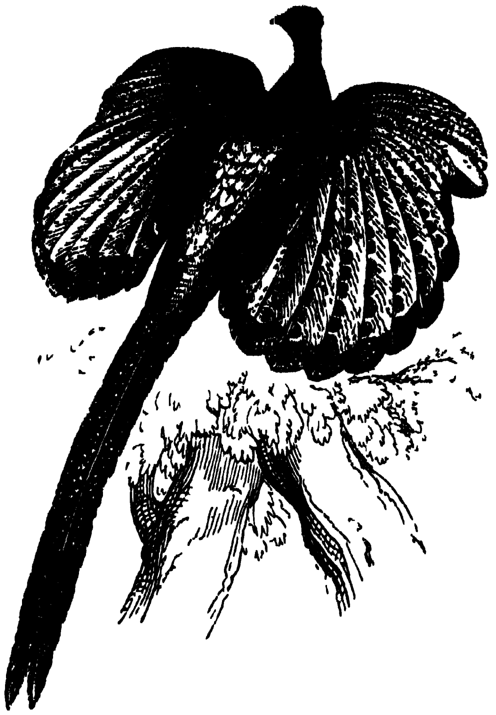
Our pictorial specimens are those of wild individuals; the domestic bird figures in the Group of Poultry (Fig. 1718, *b*).

This noble bird, one of the ornaments of our poultry-yard, is a native of America, whence it appears to have been imported into Europe in the early part of the sixteenth century. But it must be confessed that nothing very tangible or definite respecting its introduction has been recorded. So involved in obscurity is the early history of the turkey and so ignorant as to the writers of the sixteenth and seventeenth centuries appear to have been about it, that they have regarded it as a bird known to the ancients under the title of "Meleagris," namely, the guinea-fowl, or Pintado, a mistake which was not cleared up till about the middle of the eighteenth century; but the name, originally applied in error, has been since continued rather for the sake of convenience than because of its propriety. The appellation of "Turkey," which the bird bears in our country, arose, according to Willughby, from a supposition that it came originally from the country so called, and Mr. Bennett observes that such an erroneous opinion may possibly have arisen from that confusion which appears to have at first existed between these birds and guinea-fowls, the latter being commonly obtained from the Levant, and being also in the sixteenth century exceedingly rare in England. Oviedo, in his 'Natural History of the Indies,' the title then given to the newly discovered regions of America, speaks of it as a kind of peacock abounding in New Spain, which had already (1526) been transported in a domestic state to the islands and the Spanish Main, where it was kept by the Christian colonists. Mexico was first discovered by Grijalva in 1518. In the fifteenth year of Henry VIII., 1524, turkeys are reported to have been introduced into England, and in 1541 we find these birds among the dainties of the table. Archbishop Cranmer (Leland's 'Collectanea') ordered that of cranes, swans, and turkey-cocks there should be at festivals only one dish. In 1573, Tusser, in his 'Five Hundred Points of Good Husbandry,' notices these birds as among the farmer's fare at Christmas. At the present day the domestic turkey is spread over the greater portion of Europe, and is too well known to need description.

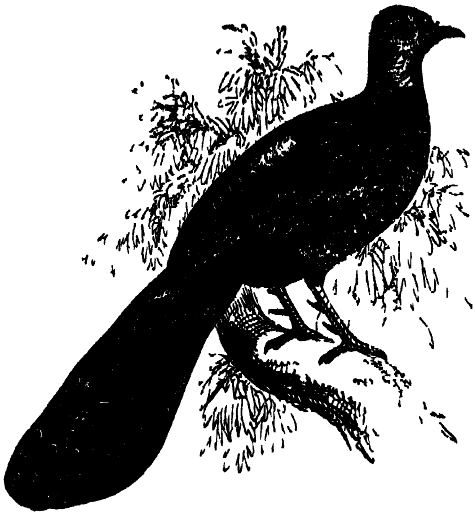
The habits of the wild turkey are admirably detailed by Audubon and the Prince of Canino, whose accounts we shall follow. The native country of this species extends from the north-western territory of the United States to the Isthmus of Panamá, south of which it is not to be found. It was formerly common in many parts of Canada, as well as in districts within the States, whence it has been driven by the advance of colonization, and must now be sought for in remoter localities. The unsettled parts of the states of Ohio, Kentucky, Illinois, and Indiana, an immense country to the north-west of these districts, and the vast regions drained by these rivers, from their confluence to Louisiana, including the wooded parts of Arkansas, according to Audubon, are the most abundantly supplied with this magnificent bird. The wild turkey is to a certain degree migratory in its habits, and associates in flocks during the autumn and winter months. About the beginning of October, when the fruits and seeds are about to fall from the trees, these birds collect together and gradually move towards the rich bottom-lands of the Ohio and Mississippi. The males, or "gobblers," associate in parties varying from ten to a hundred, and search for food apart from the females; the latter, with their young broods, usually join each other, forming parties of seventy or eighty, and assiduously avoid the old males, which evince a disposition to attack and destroy the young till they are fully grown. The flocks of the district all move in the same direction, seldom taking wing unless to escape the hunter's dog, or cross a river, which latter feat is not performed till after some delay, during which they ascend the highest eminences, and strut about and gobble as if to raise their courage to a pitch befitting the emergency. Even the females and young assume at this juncture a pompous demeanour, spread out their tails, and "pur" loudly. When the weather is settled, and they themselves prepared, they take to flight for the opposite shore; the old and robust easily cross a river of the breadth of a mile, but the young and meagre birds often find their strength fail, and fall into the water, not, however, to be drowned, as might be imagined. They bring their wings close to the body, spread out their tail, stretch forward their neck, strike out vigorously with their legs, and rapidly make way to the shore. It is remarkable that after landing on the opposite banks of a large stream, the flocks ramble about for some time as if bewildered, and many fall a prey to ferocious beasts or the hunter. When they have arrived in their land of abundance, they disperse in small flocks, composed of individuals of both sexes and all ages intermingled; this occurs about the middle of November. The mast, or fruit of the beech, has now fallen in abundance; but besides this, maize, the peccan-nut, and the acorn are also relished, and they devour beetles, grasshoppers, tadpoles, young frogs, and small lizards. At this season they often venture near farm-yards and barns, and numbers are killed for sale.



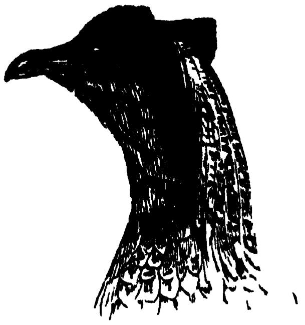
1747.—Crested Peacock Pheasant



1744 Argus Pheasant.

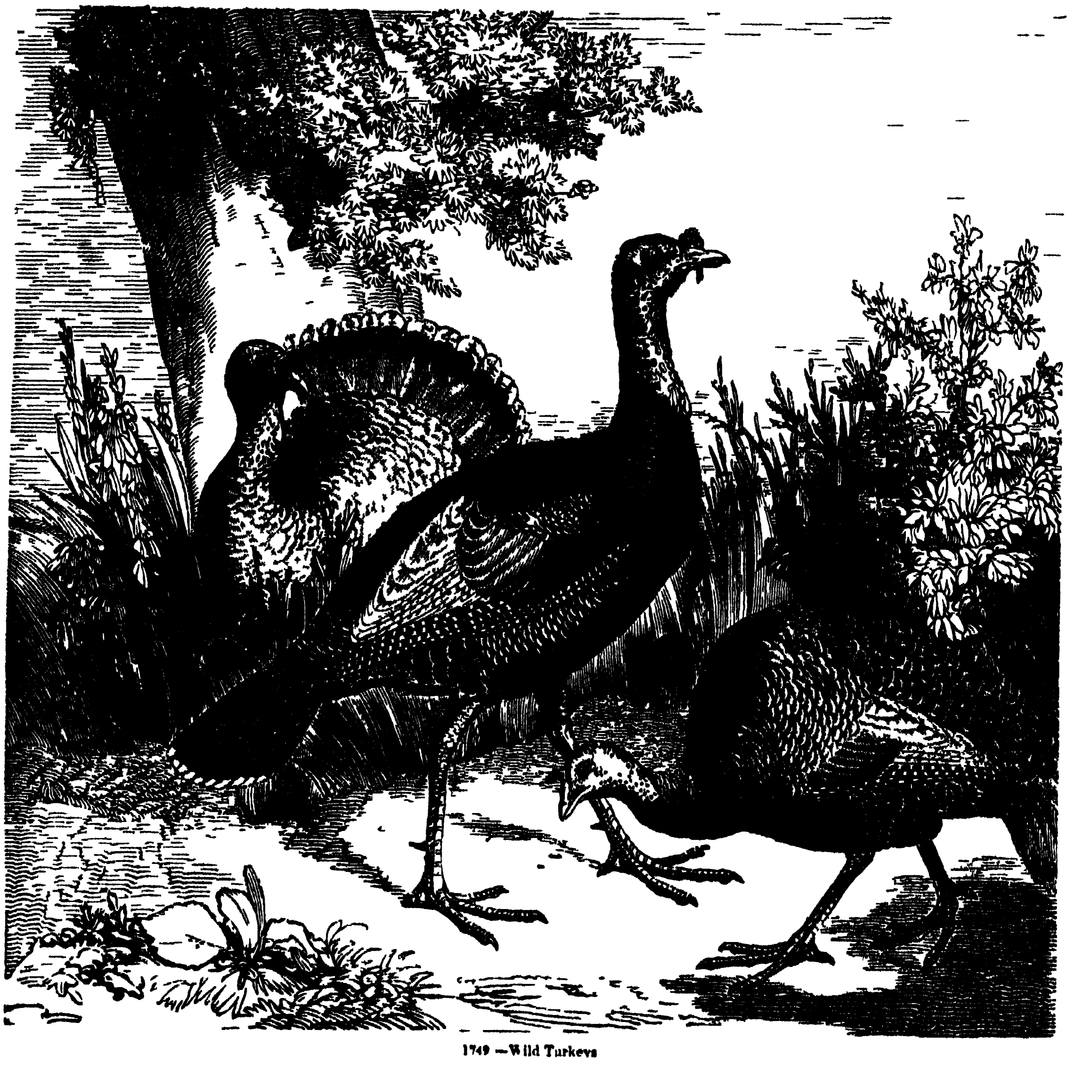


1748 —Thibet Peacock Pheasant

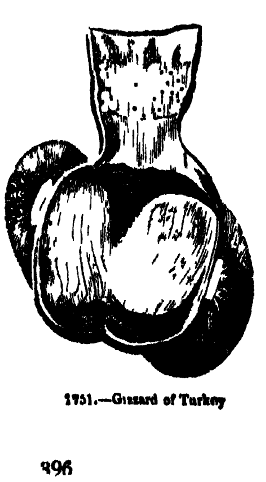


1745 —Head of Argus Pheasant

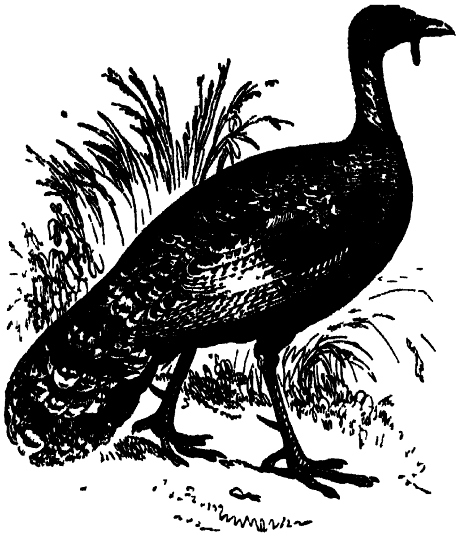
1746 —Secondary Quill Feather of Argus Pheasant



1749 —Wild Turkeys

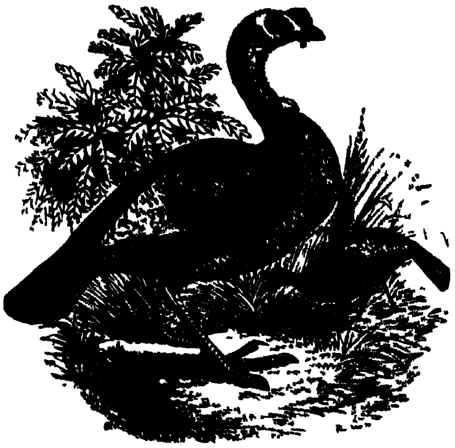


1751.—Gizzard of Turkey



1752 —Honduras Turkey

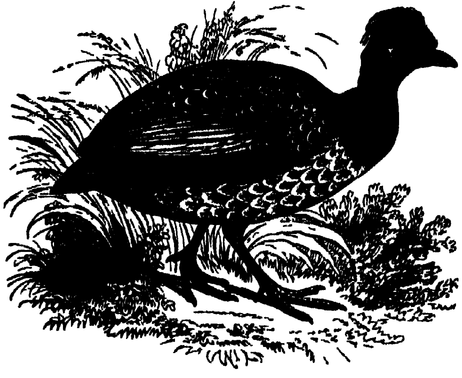
1753 —Head of Guinea Fowl



1750 —Wild Turkey and Young

1755 —Capercaillie

1757.—Black Grouse, Male.



1754 —Crested Guinea Fowl.

1758.—Black Grouse Female

Early in March they begin to pair, the females having previously assumed a solitary mode of life, feeding and roosting apart by themselves; when they call, the males respond, and the woods sometimes resound for miles with the clamour. Rival males often engage in mortal combat. As soon as the females begin to lay, they relinquish the society of their mates, and soon attend exclusively to the duty of incubation; the nest, which consists of a few leaves, is artfully concealed in some brake or under the covert of a dense thicket, and the female both leaves and visits her nest with the greatest caution, lest the male should discover it, in which case he would ferociously crush the eggs in a moment. The crow, the polecat, and the snake are also dreaded; and it often happens that several hens associate together for mutual safety, rearing their broods in one united nest, which is always watched by one or more, so that no crow, raven, or polecat dares approach it. When the young are hatched, the female leads them abroad, keeping an anxious and incessant watch lest hawks and other enemies, including the turkey-cock, should attack them; the troop moves onwards, keeping to the higher grounds, for the young are only covered with down, and if wetted in this stage of their existence seldom survive. At the expiration of about a fortnight they are able to raise themselves from the ground, on which they have hitherto reposed at night, and follow their mother to a perch on the low arm of a tree, where they nestle under her broadly curved wings. The brood varies in number from ten to fifteen or eighteen. The growth of the young is rapid. In August, though still led by their respective parents, several broods associate together, and the young display almost as much alertness in securing their safety as do the adults.

In colour the wild turkey closely resembles the bronzed black varieties of the domestic race, but the plumage is more brilliant, gleaming with violet, green, and gold according to the incidence of the light. The long pectoral tassel of hair, and the naked, changeable, carunculated skin of the head and throat, are the same in the wild as in the domesticated race. Fig. 1751 represents the Gizzard of the Turkey.

1752.—The Honduras Turkey

(*Meleagris ocellata*). Beautiful as is the common wild turkey of North America, it is far surpassed by the Honduras turkey, which rivals the peacock in its gorgeous dress, effulgent with golden bronze, steel blue, emerald green, and velvet black. A specimen of this rare bird, once in Bullock's museum, is now in that of Paris. Of the habits of the species, which appears to inhabit the vast forests of Honduras, nothing is known. The specimen in question was one of three seen by a crew employed in cutting wood, and captured alive. It died after its arrival in the Thames, in consequence of an accident.

1718, *d*.—The Guinea-Fowl

(*Numida Meleagris*). Fig. 1753 shows the Head of this species, which is the Gallina di Numidia of the Italians, Pintade of the French, Pintado of the Spanish, Perl Huhn of the Germans.

The guinea fowl, or Pintado, as its name indicates, is originally from Africa. It was known to the ancient Greeks and Romans, and received from the former the name of Meleagris. According to the ancient fable, the sisters of Meleager, mourning the death of their brother, were turned into birds called Meleagrides (in the singular Meleagris), having their feathers sprinkled with tear-drops. The term Meleagris, however, strange to say, has been transferred by Belon, Gesner, Aldrovandus, and others to the turkey, a native of America, and of which the ancients had no information.

The guinea-fowl is noticed by Aristotle, by Pliny, by Varro ('De Re Rusticâ'), and by Columella, a writer on husbandry in the reign of Claudius Cæsar, and by others. According to Athenæus, the Ætolians first introduced this bird into Greece, but though it must have been naturalized there, it does not appear to have spread very widely. In the middle ages we lose all trace of it; no writers of those times appear to notice it, nor can we distinctly point out the period of its introduction into the British Isles. This however, must be comparatively recent; its name does not occur in the list of birds in the famous feast of Archbishop Nevill, in the reign of Edward IV; nor does it appear in the Duke of Northumberland's Household Book, 1512; nor yet in the Household Book of Henry VIII. Yet, in all these lists, the peron, or peacock, makes a conspicuous figure.

In the early part of the eighteenth century the guinea-fowl was tolerably common in England, and is now completely naturalized.

Adanson, Dampier, Le Vaillant, and other travellers in Africa, have observed the wild guinea-fowl in different parts of that continent; but, as about six species are known, we cannot be certain which of them is intended.

The common guinea-fowl (Numida Meleagris) appears to be dispersed through an extensive range of Africa, frequenting low humid situations, and the banks of rivers and marshes. It is eminently gregarious, assembling in large flocks, which wander about during the day in search of food; as evening approaches, they seek the branches of trees, and roost crowded together. In its rapid mode of running, and in its short flight when forced to take wing, we are reminded of the partridge, which it also somewhat resembles in the contour of its body.

A wild race of these birds is found in St. Domingo and others of the West India islands; this race is said to have been imported from Guinea.

In a domestic condition, the guinea-fowl retains almost unaltered its original habits; it is restless, addicted to wandering, and impatient of restraint. It will stray for miles from the farm to which it belongs, and it often happens that a long-missed female will make her appearance with a young brood attending her. In close confinement the female rarely hatches her eggs, the want of freedom interfering with her instincts; few birds indeed are more recluse and shy during the time of incubation, or more cautious in concealing their nests. It is generally made among dense brushwood or in similar retreats. The number of eggs varies from twelve to twenty. They are smaller than those of the fowl, of a pale yellowish red, minutely dotted with darker points. Both the eggs and flesh of the guinea fowl are excellent. Cream-coloured guinea-fowls are sometimes to be seen; in these the white spots are still to be distinguished. Another variety has a white breast, and the general colouring destitute of the richness which renders the wild and the undegenerate domestic race so attractive. The shrill querulous notes of this bird, which it perpetually repeats, are very disagreeable. The guinea-fowl has not yet reached the colder latitudes of Europe; it is not mentioned by Linnæus in his Swedish Fauna, and it is said that neither Denmark, Norway, nor Northern Russia possesses it.

1754.—The Crested Guinea-Fowl, or Pintado

(*Numida cristata*). This species is less than the common guinea-fowl: its head is crested with hair-like feathers; the general plumage is bluish black spotted with grey. Quills yellowish brown; edges of the secondaries pure white.

Family TETRAONIDÆ (GROUSE).

Under this family title most naturalists include not only the true Grouse, but the Partridges, Quails, Francolins, &c., which, however, by some modern naturalists are regarded as a subfamily, under the name of Perdicinæ.

With regard to the true grouse, it is of the moorland and heath, the wild plain or mountain, the barren rock and the dense pine-forest, that they are respectively the tenants. Linnæus comprehended them all, together with the Partridges and Quails, in one genus, Tetrao; modern naturalists, however, have subdivided this genus into many, often on superficial grounds. A better estimate of the characters of these birds will be formed from a consideration of our pictorial specimens than from verbal definitions.

1755, 1756.—The Capercaillie, Capercali, or Capercailzie

(*Tetrao Urogallus*). Cock of the Wood, Cock of the Mountain. Coq de Bruyère of Buffon, Kjader of the 'Fauna Suecica,' Tjader hona of Hasselquist, Auer Hahn of Frisch, Auerwaldhuhn of Bechstein. Ceiliog Coed of the ancient British.

That this noble bird was once indigenous in the British islands, and till lately lingered in the Highlands of Scotland and some districts of Ireland (viz. in the county of Tipperary, 1760), has been clearly proved, but the forests which once sheltered it have been thinned or cut down, and from this cause and others it appears to have been entirely extirpated; we say "to have been," because for some years past various attempts have been made to introduce the species again into the woods of the Highlands, and, we believe, with considerable success.

The Capercaillie is abundant in Norway, Sweden, Russia towards Siberia, the north of Asia, and some parts of Germany and Hungary, wherever pine-forests of sufficient extent afford it a home. It is found in several parts of the Alps. The male is equal in size to a turkey, weighing from eight to twelve pounds or even more; some have exceeded fifteen. The female is considerably smaller. The breeding-season commences early in the spring, before the snow is off the ground; at this period the cock stations himself on a pine, and commences his call to the females or "play" as it is termed in Sweden. This, says Mr. Lloyd, "is usually from the first dawn of day to sunrise, or from a little after sunset until it is quite dark. The time, however, more or less depends upon the mildness of the weather and the advanced state of the season.

"During his play, the neck of the capercali is stretched out, his tail is raised and spread like a fan, his wings droop, his feathers are ruffled up, and, in short, he much resembles in appearance an angry turkey-cock. He begins his play with a call something resembling *peller, peller, peller*; these sounds he repeats at first at some little intervals, but as he proceeds they increase in rapidity, until at last, and after perhaps the lapse of a minute or so, he makes a sort of gulp in his throat and finishes with sucking in, as it were, his breath.

"During the continuance of this latter process, which only lasts a few seconds, the head of the capercali is thrown up, his eyes are partially closed, and his whole appearance would denote that he is worked up into an agony of passion. At this time his faculties are much absorbed, and it is not difficult to approach him: many, indeed, and among the rest Mr. Nilsson, assert that the capercali can then neither see nor hear, and that he is not aware of the report or flash of a gun, even if fired immediately near to him. To this assertion I cannot agree, for though it is true that, if the capercali has not been much disturbed previously, he is not easily frightened during the last notes of his play, yet, should the contrary be the case, he is constantly on the watch, and I have reason to know that, even at that time, if noise be made, or that a person exposes himself incautiously, he takes alarm and immediately flies.

"The play of the capercali is not loud, and, should there be wind stirring in the trees at the time, it cannot be heard at any considerable distance. Indeed, during the calmest and most favourable weather it is not audible at more than two or three hundred paces.

"On hearing the call of the cock, the hens, whose cry in some degree resembles the croak of the raven, or rather, perhaps, the sounds *gock, gock, gock*, assemble from all parts of the surrounding forest. The male bird now descends from the eminence on which he was perched to the ground, where he and his female friends join in company. The capercali does not play indiscriminately over the forest, but he has his certain stations (Tjador-lek, which may perhaps be rendered his playing-grounds). These, however, are often of some little extent. Here, unless very much persecuted, the song of these birds may be heard in the spring for years together. The capercali does not during his play confine himself to any particular tree, as Mr. Nilsson asserts to be the case, for, on the contrary, it is seldom he is to be met with exactly on the same spot for two days in succession."

The female makes her nest upon the ground, and lays from six to twelve eggs; her brood keep with her till the approach of winter, but the cocks separate from the mother before the hens. The food of this bird consists of the leaves of the Scotch fir, of juniper-berries, cranberries, blueberries, and occasionally in winter of the buds of the birch. The young are sustained at first on insects, and especially the larvæ of ants. In the male the windpipe makes a loose fold of two curves before it enters the chest, gaining by this contrivance great increase of length. The tarsi are hairy, the toes are rough beneath, with horny points, enabling the bird to rest securely on the smooth or slippery branches. The general colour of the males on the upper part is chestnut brown irregularly marked with blackish lines; the breast glossy greenish black, passing into black on the under surface; elongated feathers of the throat black, tail black. In the female the head, neck, and back are marked with transverse bars of red and black; the under surface is pale orange-yellow barred with black. Professor Nilsson assures us that the capercaillie is often reared up in a domestic state in Sweden, and is bold and disposed to attack persons, like the turkey-cock, and both this naturalist and Mr. Lloyd affirm that these birds will breed, with due care, in confinement; in fact, they give several instances by way of proof.

In the early part of the spring the London market is supplied with the capercaillie in abundance from Norway, and, owing to the rapidity of steam navigation, the birds are almost as fresh as if just shot, keeping well for many days; the flesh of the females is excellent. To those who wish to enter into the exciting details of wood-grouse shooting, we recommend Mr. Lloyd's work on 'Northern Field Sports.'

We may here allude to the Tetrao medius, or Rakelhan, which by many has been considered a hybrid between the male capercaillie and the female black grouse, but which is, we believe, undoubtedly a pure species, but very rare. Locality, Norway and Sweden.

1757, 1758.—The Black Grouse, or Black Cock

(*Tetrao Tetrix*). Female, Grey Hen. Lyrurus Tetrix, Swainson. Coq de Bois of the French; Gallo di

Monte, Gallo [illegible], of the Italians; der Birk-hahn [illegible]; Orrfugl of the Norwegians.

"The bonny [illegible]" is still a native of the wilder districts of the British Isles. It is common in the Highlands of Scotland, in Northumberland, some parts of Derbyshire and Staffordshire, in North Wales, in Surrey, Hampshire, Dorsetshire, and Devonshire, wherever wild heaths and pine-woods favour its increase. On the Continent it is found in France *and Germany*, and is abundant in Denmark, *Sweden*, Norway, and Russia. In its general habits and manners this fine species and the preceding closely agree, but the black-cock is not so strictly a forest bird; for though it frequents pine-woods, and the glens and ravines among mountain scenery, where the birch and alder overtop an oozy bed teeming with long rank herbage, it is often seen on the sides of the heathy hill, or amidst the furze, heath, and willows covering a wide extent of bog-land intervening between the pine-woods and the cultivated country. During winter the males associate in flocks, but separate early in the spring, each choosing its own station, of which it is sole master, and for which it has often to engage in desperate contests with its rivals. It now begins its loud call-note of invitation, uttered chiefly in the morning, while it displays a variety of attitudes; and mating with several females, it soon establishes its seraglio. At this season the plumage of the male assumes the richest lustre, and the naked skin over the eye becomes of the deepest scarlet. The female breeds in May, making a rude nest under the shelter of intertangled herbage or brushwood, and depositing from six to ten eggs of a yellowish grey tinge, spotted with light brown. The young of both sexes have at first the same garb, that of the female, but the young males assume their own dress in the autumn, and form a distinct society from that of the females, which is dissolved on the approach of spring. The shoots of heath, various moorland berries, the buds of the birch and alder, the young shoots of the fir tribe, and grain of various kinds, constitute the food of this species. The young feed abundantly on insects and their larvæ.

The black grouse is shy and wary, especially the old male, and the sportsman who has killed several brace of poults, or young birds, may perhaps have not seen above one or two full-plumaged cocks during the whole day's sport. The adult male, which exceeds the female in size, weighs about four pounds. The colour is deep black, with a white band across each wing. The upper surface glitters with brilliant blue and purple reflexions. Under tail-coverts white. The tail is forked, and each part curls outwardly in consequence of the form of the four outer feathers, which are square at their ends, with a semicircular sweep laterally, the outermost on each side being the longest and most curled. The female weighs about two pounds. Above orange brown, speckled, barred with black, the greater wing coverts tipped with white, breast chestnut brown barred with black. Tail slightly forked, ferruginous, spotted with black, under tail-coverts white, streaked with black.

For an account of a hybrid bird between the cock-pheasant and grey-hen, see 'Zool. Proceeds.' 1835, p. 62.

1759.—THE DUSKY GROUSE

(*Tetrao obscurus*) In the north-western regions of America, where the mountain-chain separates the waters of the Mississippi from those which flow towards the Pacific, the dusky grouse may be regarded as taking the station of the black grouse of Europe. "The dusky grouse," says Bonaparte, "is eminently distinguished from all other known species by having the tail slightly rounded, and composed of twenty broad rounded feathers. This peculiarity of the extraordinary number of tail feathers is only found besides in the cock of the plains, in which, however, they are not rounded, but very slender, tapering, and acute." Like the rest of the species of the genus Tetrao (and subgenus Bonasia), the present bird is tyrannically polygamous, and the males soon desert the females, indifferent alike to them and to their progeny.

The male of this species is entirely dusky black, and exceeds the female in size. The general plumage of the latter is dusky brown, variegated with ochre-yellow.

1760.—THE PINNATED GROUSE

(*Tetrao Cupido*). This species, celebrated for the exquisite flavour of its flesh, is strictly confined to certain portions of North America; open dry plains interspersed with trees or partially overgrown with shrub-oak being its favourite haunts. "Accordingly," says Wilson, "we find these birds on the grouse-plains of New Jersey, in Burlington county, on the bushy plains of Long Island; the pines and shrub-oaks of Pocamo in pton county, over the whole extent of the of Kentucky; on the luxuriant plains and *of the Indiana territory*, and on the vast mote plains of the Columbia river." In the thickets of these localities they find food and . The male is remarkable for a naked sac- appendage on each side of the neck, which ry times hangs wrinkled and flaccid, but *during the pairing season is distended with* d *much resembles in size and colour a large* . With this appendage is evidently con- the strange noises which the bird utters at ason, like the subdued blowing of a horn or consisting of three notes, each strongly ac- "While uttering these tones the bird ex- ll the ostentatious gesticulations of a turkey- erecting and fluttering his neck-wings (or frills), and passing before the female, and efore his fellows as if in defiance." Now n are heard some cackling notes, chiefly by the males while engaged in fight, on occasion "they leap up against each other in the manner of turkeys, but seemingly ore malice than effect." The males begin ll before daybreak, and continue it till eight in the morning, when the parties separate for food.

vere weather these birds approach barns and uses, mix with the poultry to glean up the d grains of Indian corn, and seem almost cated. Many are at this time taken in nd the gun thins their numbers. The nest o species is placed under brushwood on a t of long grass, and formed with little art, s are about fifteen in number, and of a sh white. The young form coveys or packs, separate on the approach of spring.

male of the pinnated grouse weighs about pounds and a half. The neck is furnished sort of winglet above each sac, composed of n feathers, of which five are black, and the rest, are shorter, black streaked with brown. The slightly crested, and over each eye is a semi- comb of rich orange.

general plumage is variegated with trans- markings of black, reddish brown, and white. l is very short and of a dusky brown. Breast nder parts brown, transversely marked with throat marked with touches of reddish white, and black, under the eye a dark ol brown. The female is considerably less he male, of a lighter colour, destitute of the wings, of the naked sacculated appendages, he semicircular comb over the eye. Green various moorland berries, clover-leaves, the f the pine, grain, and insects, constitute the of the pinnated grouse. The legislature of tates inflicts a penalty of two dollars and a half, osts, on any person who kills one of these birds, in popular language heath-hens, within the ces of Suffolk or Queen's, between the 1st of and the 5th of October; but unfortunately, the lerates very little towards their preservation.

1761, 1762.—THE RUFFED GROUSE

(o *umbellus*) Bonasia umbellus, Bonaparte species, the partridge of the Eastern States, e pheasant of Pennsylvania and the Southern s, inhabits an extensive range of country. "It mon at Moose Fort, on Hudson's Bay, in lat frequent in the upper parts of Georgia, is very dant in Kentucky and the Indian territory, and ound by Captains Lewis and Clarke in crossing reat range of mountains that divides the waters e Columbia and Missouri, more than 3000 n by admeasurement from the mouth of the ls. Its favourite places of resort are high moun- covered with the balsam pine, hemlock, and of evergreens. Unlike the pinnated grouse, ays prefers the woods, is seldom or never in open plains, but loves the pine-sheltered ties of mountains near streams of water." bird is solitary in its habits, being usually singly or in pairs, and seldom in coveys of than four or five together.

e male is remarkable for producing a drum- noise, principally during the spring, but occa- ally at other seasons; it is the call of the cock mate, and when heard in the solitudes of the has a singular effect. This noise is not the of the bird, but is occasioned by smart strokes wings. "The bird, standing on an old pros- log, generally in a retired and sheltered situa- lowers his wings, erects his expanded tail, con- his throat, elevates the two tufts of feathers e neck, and inflates his whole body somewhat e manner of a turkey-cock, strutting and wheeling about with great stateliness. After a few manœuvres of this kind he begins to strike with his stiffened wings in short and quick strokes, which become more and more rapid until they run into each other," producing a hollow drumming noise, which may be heard at a considerable distance. This is most commonly performed in the morning and evening, but is repeated at intervals during the day, and guides the gunner to the retreat of the bird, which is easily shot.

The female breeds in May, artfully concealing her nest, which contains from nine to fifteen eggs. She carefully attends her brood, and, like the partridge of Europe, puts various manœuvres into practice, in order to decoy intruders from the place of their concealment.

The ruffed grouse flies with great vigour, and with a loud whirring noise, and when sprung sweeps to a considerable distance through the wood before alighting. Great numbers are killed for the table, and according to Wilson, the birds are in the best condition in September and October, during which months they feed chiefly on whortle-berries and the little red aromatic partridge-berry.

The general colour of the male is chestnut-brown, mottled and undulated with blackish brown and grey, tail grey, undulated and barred with blackish brown; shoulder-tufts velvet-black with green reflexions, and covering a large space of the neck destitute of feathers. The female is paler tinted than the male, the shoulder-tufts are orange-brown.

1763.—THE COCK OF THE PLAINS

(*Tetrao Urophasianus*). Centrocercus Urophasianus, Swainson.

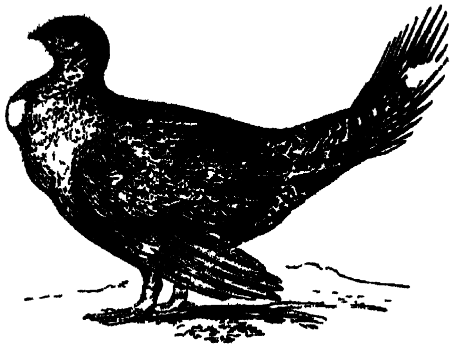
This species, which is a native of the barren arid plains along the river Columbia and the interior of North California, appears to have been first recorded by Lewis and Clarke, and has been described by Mr. Douglas, who found it among the Rocky Mountains. From the slender form of the quill-feathers of the wings, and those of the tail, the flight of this species is slow, unsteady, and accompanied by a whirring sound. "When startled," says Mr. Douglas, "the voice, *cuck, cuck, cuck*, is like that of the common pheasant. They pair in March and April. Small eminences on the banks of streams are the places usually selected for celebrating the weddings, the time generally about sunrise. The wings of the male are lowered, buzzing on the ground, the tail spread like a fan, somewhat erect, the bare yellow œsophagus is inflated to a prodigious size—fully half as large as his body—in marked contrast with the scale-like feathers below it on the breast, and the flexile silky feathers on the neck, which on these occasions stand erect. In this grotesque form he displays in the presence of his intended mate a variety of attitudes. His love-song is a confused, grating, but not offensively disagreeable tone,—something that we can imitate, but have a difficulty in expressing. *Hurr hurr-hurr-r r-r-hoo*, ending in a deep hollow tone, not unlike the sound produced by blowing into a large reed. Nest on the ground, under the shade of Purshia and Artemisia, or near streams, among Phalaris arundinacea, carefully constructed of dry grass and slender twigs. Eggs, from thirteen to seventeen, about the size of those of the common fowl, of a wood-brown colour, with irregular chocolate blotches on the thick end. Period of incubation twenty one to twenty two days. The young leave the nest a few hours after they are hatched. In the summer and autumn months these birds are seen in small troops, and in winter and spring in flocks of several hundreds."

The flesh is dark coloured, but not particularly good in point of flavour. The sacculation of the œsophagus, to which allusion has been made, is double, and the skin covering it deep orange yellow. The male is about twenty two inches in length, and weighs from six to eight pounds. The general colour of the upper parts is light brown, mottled and variegated with dark umber-brown and yellowish white. Shafts of all the feathers of the breast black and rigid; the feathers of the sides are white and scale-like: throat and head varied with blackish on a white ground; on each side of the protuberances, and higher up on the neck, is a tuft of feathers, having the shafts greatly elongated, naked, gently curved, and tipped with a pencil of black barbs. In the female these filamentous feathers are wanting; her size is much less than that of the male, and there are no scale-like feathers on the chest and sides.

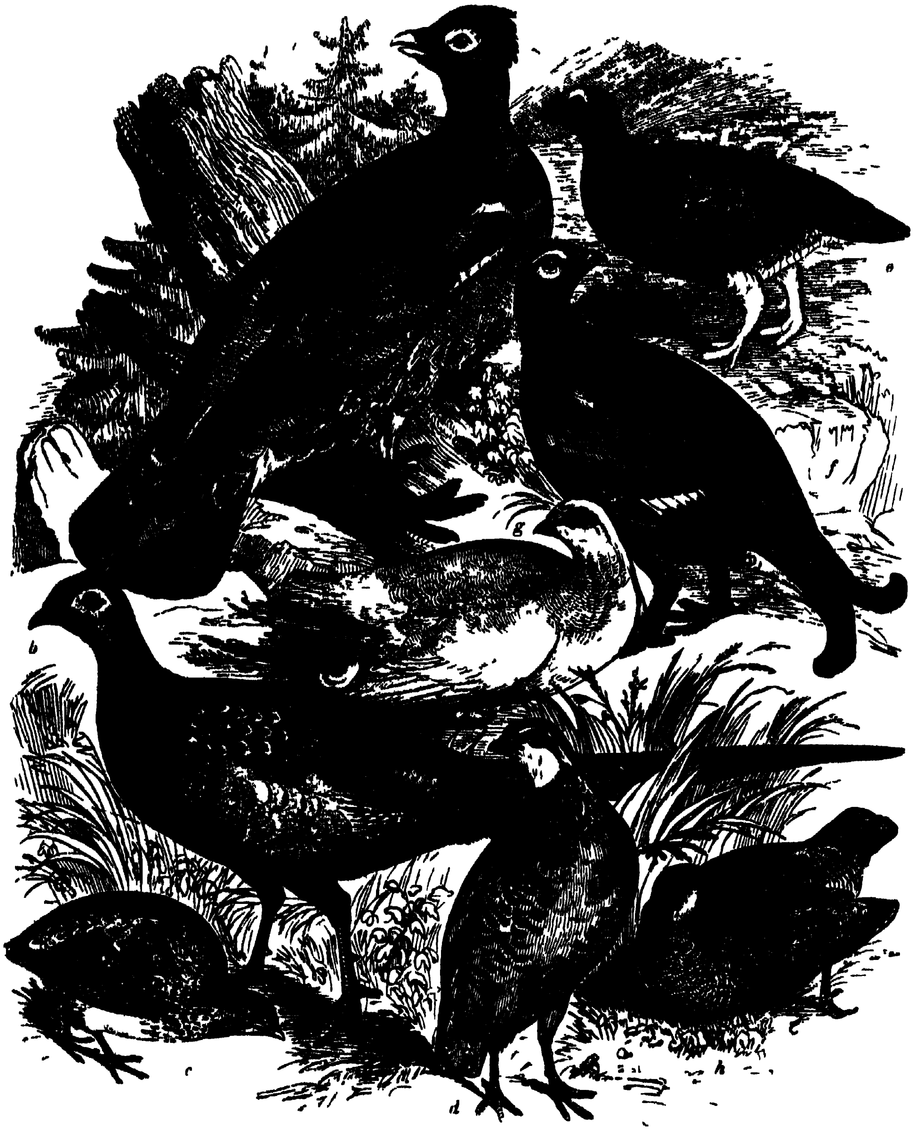
1764.—A GROUP OF GAME.

a, the Capercailzie; *b*, the Pheasant; *c*, the Quail; *d*, the Red-legged Partridge; *e*, the Red Grouse; *f*, the Black Grouse; *g*, the Ptarmigan; *h*, the Common Partridge.

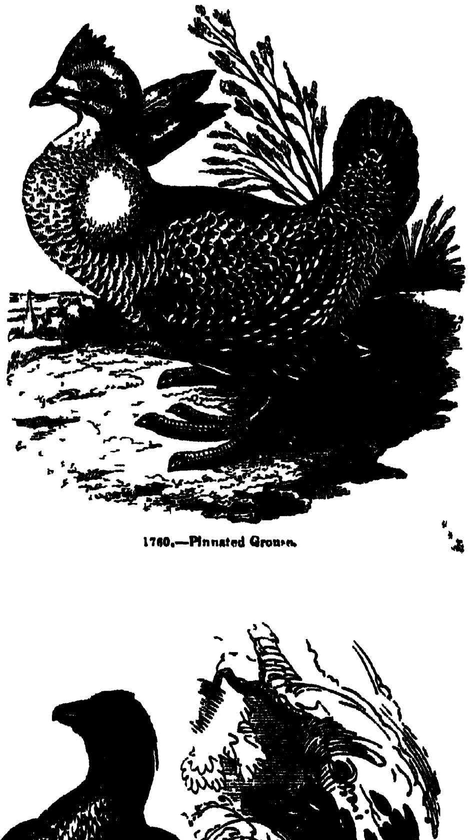
END OF VOLUME I.



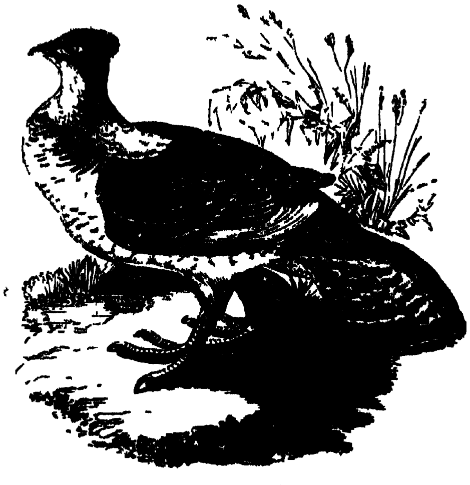
1763.—Cock of the Plains.



1764.—Group of Game



1760.—Pinnated Grouse.



1762.—Ruffed Grouse.

1759.—Dusky Grouse.

1761.—Ruffed Grouse.